

RESOLUTION

WHEREAS, the Shoshone-Bannock Tribes Environmental Waste Management Program (“EWMP”) developed Soil Cleanup Standards for Contaminated Properties (“Cleanup Standards”) pursuant to Section 201(B) and 605(D)(2) of the Shoshone-Bannock Waste Management Act (“Waste Management Act”); and

WHEREAS, pursuant to Section 901 of the Waste Management Act, the EWMP invited and considered comments from the public on the proposed Cleanup Standards, both before and after the Business Council of the Shoshone-Bannock Tribes amended the Waste Management Act; and

WHEREAS, pursuant to Waste Management Act § 901(B), the EWMP provided a written response to all significant written and oral comments received from the public and issued final Cleanup Standards reflecting the response to comments on December 2, 2010; and

WHEREAS, the EWMP has provided the final Cleanup Standards to the Business Council of the Shoshone-Bannock Tribes for review and requests that the Business Council approve the Cleanup Standards so that they may become immediately effective, pursuant to Waste Management Act § 901(C);

NOW, THEREFORE, BE IT RESOLVED BY THE BUSINESS COUNCIL OF THE SHOSHONE-BANNOCK TRIBES, that the Fort Hall Business Council hereby approves the Shoshone-Bannock Tribes Soil Cleanup Standards for Contaminated Properties, to be effective immediately.

Authority for the foregoing resolution is found in the Indian Reorganization Act of June 18, 1934 (48 Stat., 984) as amended, and under Article VI, Section 1 (r) of the Constitution and Bylaws of the Shoshone-Bannock Tribes of the Fort Hall Indian Reservation of Idaho.

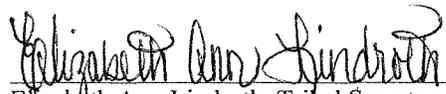
Dated this 6th day of January 2011


Nathan Small, Tribal Chairman
Fort Hall Business Council

S E A L

CERTIFICATION

I HEREBY CERTIFY, that the foregoing resolution was passed while a quorum of the Business Council was present by a vote of 5 in favor, 1 absent (NS), and 1 not voting (GDF) on the date this bears.


Elizabeth Ann Lindroth, Tribal Secretary
Fort Hall Business Council

ENVR-2011-0022

**Shoshone-Bannock Tribes
Environmental Waste Management Program**

**Soil Cleanup Standards for
Contaminated Properties**

December 2, 2010

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1 Introduction

1.1 Purpose and Authority

The Shoshone-Bannock Tribes (“Tribes”) Soil Cleanup Standards (“Cleanup Standards”) were developed pursuant to Section 201(B) of the Shoshone-Bannock Tribes Waste Management Act (“WMA”), which authorizes the Environmental Waste Management Program (“EWMP,” or “the Program”) to promulgate regulations necessary to carry out the purposes of the WMA. In WMA § 101, the Fort Hall Business Council states its policy to “preserve, protect, and enhance the environmental quality of the Tribal homeland, Fort Hall Reservation, for present and future generations,” § 101(A), and to “restore and maintain environmental quality on the Reservation,” § 101(D)(5). *See also* WMA §§ 103–104 (providing for the management and cleanup of wastes within the Fort Hall Reservation and all trust lands).

The Cleanup Standards also are promulgated pursuant to WMA § 605(D)(2), which authorizes the EWMP to promulgate applicable or relevant and appropriate requirements (“ARARs”), as defined under WMA § 105(C), for response actions at contaminated sites on the Reservation. The Cleanup Standards are intended to be ARARs and are intended to prevent threats to human health and the environment and to natural and cultural resources within the Reservation. *See* WMA § 211(D) (regulations to protect human health, natural and cultural resources, and the environment).

The Tribes’ goal in promulgating the Cleanup Standards is to restore all land within the Reservation to its original state, that is, prior to the contamination that the standards are designed to address, in order to protect the original purposes and uses of the Tribes’ land. The Reservation was set aside for the absolute and undisturbed use and occupation of the Tribes, as a home in perpetuity for the members of the Tribes, pursuant to the Treaty with the Eastern Band Shoshoni and Bannock of 1868, made at Fort Bridger, 15 Stat. 673, by the United States of America. The traditional and agricultural use of the land and natural resources of the Reservation is the lifeblood of the Shoshone-Bannock Tribes, and must be preserved. In addition, the Tribes’ deeply rooted traditional and cultural connection with the land is integrally related to the well-being of Tribal members and overall Tribal morale. The WMA recognizes this integral connection, and consequently states that “traditional, religious and cultural uses dependent upon Reservation lands and water must be protected to maintain the way of life and traditional activities of the Tribes,” WMA § 101(B)(6). The Cleanup Standards are therefore deliberately conservative. The Tribes recognize, however, that there are situations where use of Commercial/Industrial Cleanup Standards rather than Unrestricted Use standards may be appropriate, or where attainment of the Cleanup Standards may be technically impracticable. The Cleanup Standards provide alternatives for these situations, as discussed further in Part 3 below.

Terms used in these regulations shall have the meanings provided in the WMA, unless specifically defined otherwise.

1.2 Framework for the Cleanup Standards

The Cleanup Standards are listed in Tables A through D attached to this document. They specify soil concentrations for over 100 hazardous chemicals, in amounts that the EWMP considers generally below the threshold of concern for human health and the environment. Tables A through D reference associated Lookup Tables A-1 through J, which are the source of information for the Cleanup Standards.

The A through B series tables summarize cleanup standards and protective values compiled for soil under unrestricted (A-1, B-1) and commercial/industrial (A-2, B-2) land use scenarios. The C series tables summarize protective values compiled specifically for indoor-air impact concerns. Protective values for groundwater and surface water are summarized in the D series tables. Tables E through J provide supporting protective values and other information for the earlier tables.

The Cleanup Standards and Lookup Tables are based on the San Francisco Bay Area Regional Water Quality Control Board Environmental Screening Levels (“ESLs”),¹ which consider adverse environmental effects of contamination in addition to direct human health impacts. The ESLs, revised in May 2008, are in turn based on the January 2005 California Human Health Screening Levels (“CHHSLs”),² which were developed under the California Land Environmental Restoration and Reuse Act of 2002. The CHHSLs present concentrations of 54 hazardous chemicals in soil and soil gas³ that the California Environmental Protection Agency (“Cal/EPA”) considers at or below the threshold of risk to human health, that is, an excess lifetime cancer risk of one-in-a-million (10^{-6}) and a hazard quotient of 1.0 or less for non-cancer health effects.⁴

The CHHSLs were designed to protect human health from direct and indirect exposure to contaminated soil through ingestion and dermal absorption, the inhalation of vapors and dust outdoors, and the inhalation of subsurface vapors that have been emitted to the interiors of buildings. They were developed using the standard exposure assumptions and chemical toxicity

¹ http://www.swrcb.ca.gov/rwqcb2/water_issues/available_documents/ESL_May_2008.pdf.

² http://www.calepa.ca.gov/Brownfields/documents/2005/CHHSLs_Guide.pdf.

³ Soil gas refers to gaseous elements and compounds — such as air, water vapor, and pollutants — that are found in the small spaces between particles of soil or rock, and which may be carried by air leakage into a building or otherwise moved through or from the substrate depending on changes in pressure. The CHHSLs do not include screening levels for direct-exposure volatile organic compounds (“VOCs”), as they present direct-exposure screening levels in regards to contaminated soil for semi-volatile and non-volatile compounds only, but they do include VOC-specific soil gas screening levels for potential vapor intrusion concerns.

⁴ Exposure criteria for contaminated media vary with the characteristics of the exposed population and the frequency and duration of its exposure. Estimates of non-cancer risks thus assume there is a level of exposure below which it is unlikely for an individual to experience adverse health effects. One common method of evaluating non-cancer risks is to generate a hazard quotient: the ratio of exposure to the relevant toxicity value for each contaminant, which value is derived from experimental or epidemiological data and is expressed as a daily reference dose (“RfD”).

values embodied in the USEPA Region 9 Preliminary Remediation Goals (“PRGs”).⁵ The ESLs, however, use Cal/EPA toxicity and skin absorption factors for specific contaminants, when available, rather than using those factors published by USEPA.

Because the ESLs incorporate the CHHSLs, the assessments’ respective screening levels for soil and soil gas are essentially identical, except that the ESLs have used a more conservative hazard quotient of 0.2 to calculate screening levels for non-carcinogens. The ESLs assume that up to five chemicals with similar non-cancer health effects may be present at a given site, and so divide the initial screening level, based on a hazard quotient of 1.0, by a factor of five, thereby taking potential cumulative health risks into account.

Moreover, the ESLs present screening levels for more than 100 commonly detected contaminants⁶ and account for a breadth of ecological concerns not reached by the CHHSLs: the leaching of contaminants into groundwater; toxicity to flora and to terrestrial and aquatic receptors (through the contamination of soil and/or groundwater discharge to surface water); sullied drinking water; and the gross contamination of groundwater and soil (nuisance odors, e.g., and general resource degradation). As compared to the PRGs, the ESLs have for instance added soil and groundwater screening levels for Total Petroleum Hydrocarbons (TPH) and a more rigorous leaching model vis-à-vis groundwater quality.

The ESLs contain four sets of lookup tables, differentiated to account for specific site characteristics: shallow soils/potential drinking water resource threatened (Table A); shallow soils/potential drinking water resource not threatened (Table B); deep soils/potential drinking water resource threatened (Table C); and deep soils/potential drinking water resource not threatened (Table D).⁷ In addition, each of the tables provides separate soil screening levels for residential and commercial/industrial land use. Residential use assumes sites will be used for residences, hospitals, daycare centers, and other sensitive purposes. Commercial/industrial use assumes that only working-age adults will be present at the site on a regular basis.

Chapters 4-9 of the ESLs explain how the values found in the lookup tables and additional screening levels were developed. Specifically, a discussion of screening levels compiled for surface water and groundwater is provided in Section 5; for soil in Section 6; for indoor air and related screening levels for shallow soil gas in Section 7; and for Total Petroleum

⁵ <http://www.epa.gov/region09/superfund/prg/>. The PRGs are now historic, as they “have been harmonized with similar risk-based screening levels [“RSLs”] used by Regions 3 and 6.” As of April 2009, the PRGs have been supplanted by RSL Tables.

⁶ These screening levels include direct exposure to VOCs from contaminated soil.

⁷ Shallow soils refers to a depth of three meters, where a potential exists for regular direct exposure of residents and/or office workers (and also of terrestrial flora and fauna), and deep soils refers to depths where only periodic exposure during construction and utility maintenance work is considered likely. The potential for deeper soils to be brought to the surface in the future would be evaluated on a site-by-site basis. Consequently, the ESLs for relatively non-mobile chemicals are generally less stringent for deep soils than the corresponding ESLs for shallow soils. In contrast, for chemicals that are easily leached from soil or potentially volatilized to the air, groundwater and indoor-air protection concerns usually drive selection of the final ESL regardless of the depth of the contaminated soil, and the corresponding shallow and deep soil ESLs are identical.

Hydrocarbon (TPH) in Section 8. Other issues pertinent to the lookup tables are discussed in Section 9. Certain of these screening levels reflect the results of general studies of national application, and others reflect algorithms and models calculated through site-specific variables. These approaches are described as conservative and protective. *See* ESLs at 1-10 (“The ESLs are intended to be conservative for use at the vast majority of contaminated sites in developed areas.”); *see also* ESLs at 2-3 (“The lowest of the individual screening levels for each concern was selected for inclusion in the summary ESL tables . . .”).⁸ The ESLs may thus be used to screen sites for long-term, chronic threats where a release of hazardous chemicals has occurred. Data collected at a site is compared to the appropriate set of screening levels and the need for additional action quickly determined. Under most circumstances, the presence of contaminants in soil, soil gas, or groundwater in concentrations below the corresponding ESL can be assumed not to pose a significant health risk to people who may live (residential levels) or work (commercial/industrial levels) at the site, or to raise the ecological concerns described above.⁹ The presence of a chemical at concentrations in excess of an ESL suggests that further evaluation is warranted.

Chapter 6 of the ESLs explores the technical bases and limitations used to calculate screening levels for the two land use scenarios: duration of exposure to carcinogenic and non-carcinogenic contaminants, and the age-adjustment of exposure parameters. In summary, a residential receptor is assumed to be an adult or child who occupies a dwelling on the site 24 hours per day, 350 days per year, for thirty years. Exposure to soil is expected to occur during home maintenance activities, yard work and landscaping, and outdoor play. The duration of exposure to carcinogens is averaged over the receptor’s lifetime because cancer may develop even after the exposure has ceased. The exposure parameters are age-adjusted for children (1-6 years old) and adults (7-31 years old), given the physiological and behavioral differences between them. Non-carcinogenic contaminants on residential sites are evaluated based solely on childhood exposures: higher contaminant intake is paired with lower relative body weight. *See generally* ESLs at 6-2 to 6-6. In contrast, ESLs for non-residential uses are based solely on exposures to adults, but given “the wide range of activities and exposure levels a non-residential receptor may be exposed to during various work-related activities, it is important to ensure that the default exposure parameters are representative of site-specific conditions.” *See generally* ESLs at 6-6 to 6-7.

Since the Shoshone-Bannock Tribes Soil Cleanup Standards are based on the ESLs, the discussions in the ESLs referenced above may be referred to if more information is desired when

⁸ Additional conservative assumptions in the ESLs are found, for example, in the total rainfall said to infiltrate the surface and reach groundwater and in that the biodegradation part of this process is admittedly overlooked. *See* ESLs 1-4, 6-14. At the same time, leaching-based screening levels were generated only for chemicals considered to be significantly soluble and mobile in groundwater under normal, ambient conditions, thereby excluding physical-chemical conditions that may promote the enhanced leaching of metals and other chemicals from soils or waste piles (*e.g.*, mining-related wastes).

⁹ This is Tier 1 of the so-called Tiered Approach. Under Tier 2, selected components of the models used to develop the Tier 1 ESLs are modified with respect to site-specific data or considerations (*e.g.*, assumed depth to contaminated groundwater), thus resulting in a revised screening level to be utilized as in Tier 1. Under Tier 3, alternative models and modeling assumptions are utilized to develop site-specific screening levels or final cleanup levels or to quantitatively evaluate the actual risk posed to human and/or ecological receptors by the contaminated media. *See generally* ESLs 1-1 – 1-2.

reviewing the Cleanup Standards and associated Lookup Tables. The EWMP based the Shoshone-Bannock Tribes Cleanup Standards on the ESLs because it determined that those numeric, scientifically determined benchmarks would be protective of both the public health and the environment on the Reservation.¹⁰ The EWMP believes that setting uniform cleanup standards, with provisions for waiver or alternative standards when appropriate, as opposed to using a tiered approach (see footnote 9) in all instances, is the best way to protect the Tribes' health, resources, and environment and their traditional and cultural beliefs and values. Moreover, a uniform cleanup standard eliminates or reduces the time and expense otherwise required for owners and operators to prepare detailed environmental risk assessments.¹¹

As noted above, there are two sets of Cleanup Standards, one for the Unrestricted Use of the site in question and a second set for its Commercial/Industrial Use. The EWMP requires compliance in the first instance with the Unrestricted Use standards, to further the Tribes' goal of restoring Reservation land to ensure that the Tribes' resources may be used for traditional and cultural purposes into the future, and not lost to contamination from commercial and industrial development. At the same time, the Tribes recognize that there are situations when commercial or industrial use of a site may be appropriate; in these instances, a waiver may be sought pursuant to § 3.1 for the application of the Commercial/Industrial Use standards.

Soil, soil gas, and indoor air data collected at a site should be directly compared to the Unrestricted Use Cleanup Standard for each chemical and exposure pathway of concern. Under most circumstances, the presence of a chemical in soil, soil gas, or indoor air at concentrations below the relevant Cleanup Standard will be assumed not to pose a statistically significant short- or long-term health risk to adults or children who may live or work at the site, or who may otherwise interact with the site, and also not to pose a statistically significant short- or long-term adverse impact on the environment. There may be instances, however, where the Cleanup Standards are inadequate to protect human health and the environment or are otherwise inappropriate due to site-specific environmental concerns, as described in §§ 1.4 and 4.1. In those instances, further evaluation may be advisable and may, for example, include additional sampling at the site, consideration of ambient levels in the environment, and, depending on site information, performance of a site-specific risk assessment as provided in Chapter 4. Where it is technically impracticable to meet the Cleanup Standards, a waiver from those standards may be granted, pursuant to § 3.2.

1.3 Chemicals Not Listed in the Lookup Tables

The Cleanup Standards and associated Lookup Tables list over one hundred chemicals,

¹⁰ The research, methodologies, and calculations that undergird the San Francisco Soil Screening Levels, the Indoor Air and Soil Gas Screening Levels, and the Soil and Groundwater Screening Levels for TPH (Total Petroleum Hydrocarbons) are fully described in Chapters 6, 7, and 8, respectively, of the ESL document. Additionally, the many studies, articles, and reference works upon which the ESLs are based are listed in Chapter 10 of that document. A list of resources specific to these Cleanup Standards is found in Chapter 5 of this document.

¹¹ The ESLs are designed to eliminate the need for risk assessments wherever possible, and so are well-suited for use as cleanup standards. See ESL Document at 1-1, 1-10.

many of which are commonly found at sites where releases of hazardous wastes have occurred. The EWMP plans to incorporate Cleanup Standards for additional chemicals that may similarly pose a risk to human health or the environment as they become available. The Cleanup Standards also will be updated as necessary to incorporate new exposure assumptions and chemical toxicity values for already-referenced chemicals. In addition, it is a requirement of these Cleanup Standards that soils that exhibit the characteristics of ignitability or reactivity, as those terms are defined under RCRA and federal regulations implementing RCRA, must be treated to eliminate those characteristics, or else be removed from the site. Any revisions to the Cleanup Standards will be developed pursuant to the rulemaking procedures prescribed in WMA § 901.

1.4 Limitations

The EWMP recognizes that the Cleanup Standards may not be adequate to address every environmental condition that might be present at a contaminated site. Site-specific conditions that have the potential to make the Cleanup Standards either insufficient or too stringent may include, but are not limited to:

- The presence of inorganic chemicals (*e.g.*, metals) which are potentially mobile in leachate due to soil or groundwater conditions different from those assumed in development of the Lookup Tables (*e.g.*, low pH in groundwater at mine sites);
- The existence of endangered or protected species that are impacted by the site;
- The presence of more than three known or suspected carcinogens or more than five identified chemicals with similar non-carcinogenic health effects;
- The presence of rivers, streams, etc. which establish a potential for erosion and the further concentration of contaminants in aquatic habitats;
- The presence of fruits, vegetables, and other plant life that is likely to be ingested by children and adults, including for traditional and cultural purposes;
- The presence of metals that naturally occur in the soil, and therefore require comparison to local background levels, see § 2.4, as the EWMP does not require cleanup of soil to below background levels;
- The presence of a naturally occurring substance in its unaltered form, or which is altered solely through naturally occurring processes or phenomena from a location where it is naturally found, see WMA § 605(B)(1), as the EWMP does not require the cleanup of these sorts of substances; and
- The presence of chemicals that are known to be biodegradable in the environment, and that therefore render the Cleanup Standards too stringent.¹²

¹² For example, Protective Values for Total Petroleum Hydrocarbons (TPH) and many non-carcinogenic,

Resources for identifying and evaluating these and other site-specific environmental concerns are provided in Part 4.

petroleum-related compounds (*e.g.*, xylenes) are driven by the protection of groundwater quality. If long-term monitoring demonstrates that actual impacts to groundwater are insignificant, then less stringent standards may be warranted.

2 Using the Cleanup Standards and Lookup Tables

2.1 Organization of the Tables

Figure 1 summarizes the range of health and environmental concerns addressed by the Cleanup Standards, which are presented in the Tables that immediately follow Part 5 of this document. These concerns include:

Groundwater Quality:

- Protection of human health
- Current or potential drinking water resource;
- Emission of subsurface vapors to building interiors;
- Protection of aquatic receptors (discharges to surface water);
- Protection against gross contamination concerns (nuisance, odors, etc.) and general resource degradation.

Soil Quality:

- Protection of human health
- Direct/indirect exposure to contaminated soil (ingestion, dermal absorption, inhalation of vapors and dust in outdoor air);
- Protection of groundwater quality (leaching of chemicals from soil);
- Protection of terrestrial (nonhuman) receptors;
- Protection against gross contamination concerns (nuisance, odors, etc.) and general resource degradation.

Soil Vapor:

- Protection of human health
- Migration of subsurface vapors to building interiors.

For the purpose of this document, soil refers to any un lithified material in the unsaturated zone that is situated above the capillary fringe of the shallowest saturated unit. The degree to which any given concern will drive environmental risk at a site depends on the actual potential for exposure and the toxicity and mobility of the chemical. Site characteristics that play an important role in evaluating potential environmental concerns or developing site-specific cleanup levels include:

- Physical location of the contaminated soil (e.g., currently or potentially exposed at the ground surface), or conditions that may warrant treatment of sources, i.e., reactions that generate soil gases;
- Beneficial use of the groundwater underlying the site or otherwise potentially threatened by the release (all water on the reservation is assumed to be a potential drinking water resource, as explained below);
- Current and anticipated future use of the site (e.g., unrestricted land use or waiver application for commercial/industrial land use only).

In order to include consideration of these site characteristics in the Cleanup Standards, four different tables were prepared (Tables A, B, C, and D). Each table reflects varying combinations of site characteristics:

- Table A – Shallow soils, potential drinking water resource threatened;
- Table B – Deep soils, potential drinking water resource threatened;
- Table C – Shallow soil gas and indoor air;
- Table D – Surface Water.

Each table provides separate soil screening levels for residential (i.e. unrestricted) and commercial/industrial (restricted) land-use scenarios. For each chemical listed in the Cleanup Standards, Lookup Tables were developed to address each applicable environmental concern under the specified combination of site characteristics. The lowest of the individual standards for each concern was selected for inclusion in the summary Cleanup Standard Tables (A through D) presented in this document. This effort ensures that the Cleanup Standards presented in these tables are generally protective of potential environmental concerns and provide a tool for rapid screening of site data. Where Cleanup Standards are exceeded, the detailed Lookup Tables can be used to identify the specific environmental concerns that may be present at the site.

For further clarification, a summary of models and exposure assumptions used for each land use can be found in the ESL Document referenced in Chapter 1. Also, as discussed in Chapter 1, the Shoshone-Bannock Tribes have a goal of restoring all land within the Reservation to unrestricted use, and thus the Cleanup Standards for Unrestricted Use are the default standards for all cleanup on the Reservation. These standards incorporate conservative assumptions regarding the long-term, frequent exposure of children and adults to contaminated soils, as well as possible ecological effects.

In contrast, Commercial/Industrial Use standards assume that only working age adults will be present at the site on a regular basis. Exposure assumptions incorporated into these Cleanup Standards are less conservative than assumptions used in the unrestricted land-use scenario. In some circumstances, described further in § 3.1, it may be appropriate to apply the Commercial/Industrial Use standards rather than the Unrestricted Use standards. Before applying the Commercial/Industrial Use standards, however, approval must be obtained from the EWMP, with the concurrence of the Land Use Planning Commission (LUPC), pursuant to § 3.1.

Unrestricted Use and Commercial/Industrial Use Soil Cleanup Standards are applicable to all depths of soils. Soils at the ground surface present immediate exposure concerns, while deeper soils could be brought to the ground surface at some time in the future, with subsequent potential exposure by human receptors. For example, exposure of workers to deep soils may occur during construction and utility maintenance work. In addition, deeper soils could have impacts on groundwater and present other ecological concerns.

All drinking water within the Reservation comes from groundwater. Thus, the Cleanup Standards assume that all groundwater beneath a given site has a potential for being used as a source of drinking water and that all shallow groundwater will ultimately discharge to a body of surface water and potentially impact aquatic organisms. The Cleanup Standards therefore

were developed to be protective of both drinking water resources and aquatic habitats.

The Cleanup Standards account for chemicals that are highly mobile in the subsurface and easily leached from contaminated soil. For chemicals that are especially toxic to aquatic life (e.g., several long-chain hydrocarbons, pesticides and heavy metals), Cleanup Standards may be driven by surface water/aquatic habitat protection concerns. The standards also consider gross contamination issues such as the presence of free product and aesthetic or odor problems.

2.2 Using the Lookup Tables

A step-by-step approach for using the Lookup Tables follows:

Step 1: Check for Cleanup Standards Applicability and Updates

The owner or operator should check with the EWMP to determine whether the Cleanup Standards may be applied to the subject site and to ensure that the most current standards are used.

Step 2:

Determine Desired Land Use

Cleanup Standards for soil are selected based on the present use of the site. In general, as discussed in Chapter 1 above, the Cleanup Standards for Unrestricted Use will be applied when remediating contaminated sites. If, however, the owner or operator, in consultation with the EWMP, believes that the property would meet the waiver standards provided in § 3.1, and such a waiver is applied for and granted, the Cleanup Standards for Commercial/Industrial Use will be applied when remediating the particular site. Reference only to Cleanup Standards for commercial/industrial land use will in most cases require that a covenant to the deed be prepared that restricts use of the property. The costs of cleanup to unrestricted use may be justified when compared to ongoing costs of maintaining administrative remedies such as a deed restriction.

Steps 3 and 4: Select Soil Cleanup Standard

Once the use of the site is determined, the owner or operator shall select the appropriate Protective Value Tables and Cleanup Standard based on the designated land use and anticipated exposure pathways. Where more than one Cleanup Standard applies, the most stringent standard shall be selected. Conditions that may result in adjustments to or replacement of particular Cleanup Standards are discussed in §§ 2.3 and 2.4. It may be necessary to replace Cleanup Standards with naturally occurring background concentrations of chemicals of concern if the latter are higher than the Cleanup Standards (see section 2.4).

The Cleanup Standards Tables are designed to be protective of groundwater and surface water resources at sites and are intended to complement rather than supersede the Tribal Water Quality Standards, Criteria and/or Cleanup Goals. In the event the Tribal Water Quality Department has Criteria and/or Standards that are more stringent, those numbers

shall apply. Only in the event that the Cleanup Standards presented herein are more stringent shall they apply.

Step 5: Determine Extent of Contaminated Soil and Other Environmental Media

Using the selected Cleanup Standards and the Protective Value Tables, determine the extent of contaminated soil or groundwater and areas of potential environmental concern at the site and offsite, as required. Soil data should be reported on a dry-weight basis. The use of data from filtered groundwater samples is generally acceptable, although this should be confirmed with the EWMP. For sites where sample data are limited, it will be most appropriate to compare the maximum-detected concentrations of chemicals of concern to the Cleanup Standards. For initial investigations the use of statistical methods to estimate more site-specific exposure point concentrations and evaluate environmental risks is not appropriate. An alternate exposure point concentration, such as the lesser of the maximum-detected concentration and the 95 percent upper confidence interval of the arithmetic mean of sample data *may* be appropriate for more detailed Site Investigations. However, any alternate method or substitution of data must be approved by the EWMP, and must comply with Section 2.3. Guidance for the estimation of exposure point concentrations, use of non-detect data, and other issues is provided in the documents *Preliminary Endangerment Assessment Guidance Manual* (CalEPA 1994b), *Supplemental Guidance For Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities* (CalEPA 1996), and *Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites* (US EPA 2002b), among other sources.

Steps 6 and 7: Evaluate the Need for Additional Investigation or Corrective Actions; Submit Appropriate Reports

Based on a comparison of available site data to the Cleanup Standards, evaluate the need for additional action at the site (e.g. additional site investigation, remedial action, preparation of risk assessment, etc.). This evaluation should be summarized in a Site Investigation report with additional actions proposed. The scope and type of the site investigation will vary depending on the history of the site and the nature of the actual or suspected chemical release. Sampling objectives should be defined and agreed upon with the EWMP prior to field activities. For example, the objective may be to determine whether a release has occurred, to identify hot spots that may require an expedited removal action, to assemble sufficient data to determine whether site remediation is necessary, or to evaluate whether site conditions would be consistent with anticipated or desired land uses. A general outline of site investigation information needed is proved in Section 2.10. Decisions for or against additional actions should always be made in conjunction with guidance from the EWMP.

2.3 Substituting Laboratory Reporting Limits for Cleanup Standards

The EWMP shall review and approve the analytical methods an owner or operator proposes to use to identify and quantify the chemicals found in soil samples so as to ensure sufficient sensitivity to low concentrations of chemicals of potential concern and the attainment

of detection limits at or below the Cleanup Standards. The EWMP may allow the use of a laboratory-method reporting limit in place of a Cleanup Standard for a particular substance where the Cleanup Standard is lower than the equivalent laboratory-method reporting limit. An example is the soil direct-exposure Cleanup Standard for dioxin for Unrestricted Use.

2.4 Naturally Occurring Concentrations for Cleanup Standards

Naturally occurring background concentrations of arsenic, beryllium, cadmium, chromium, and other metals within Reservation soils may exceed their respective Cleanup Standards. The EWMP does not require soil cleanup below background levels. The background concentration of any substance of concern for a particular site should be determined by analyzing samples from the uncontaminated areas of that site using guidance published by USEPA. Background data for nearby sites may be substituted for uncontaminated site data, but only if the data are obtained from soil of the same lithology as that found on site.

Additionally, pursuant to WMA § 605(B)(1), the EWMP does not require cleanup of a naturally occurring substance in its unaltered form, or in a form altered solely through naturally occurring processes or phenomena from a location where it is naturally found. *See* § 1.4.

2.5 Shallow versus Deep Soils

For the purposes of this document, a depth of three meters (approximately 10 feet) was used to delineate between shallow soils, where a potential exists for direct or indirect exposure of residents and/or office workers, and deep soils where periodic exposure during construction and utility maintenance work is considered likely. Some guidance is presented in the CalEPA document *Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities* (CalEPA 1996). Three meters is regarded as the likely depth that contaminated soil could at some point in the future be excavated and left exposed or intermixed with surface soil during typical redevelopment activities. The potential for deeper soils to be brought to the surface in the future should be evaluated on a site-by-site basis based on planned redevelopment or maintenance activities.

For deep soils, regular exposure of residents or commercial/industrial workers and impacts to terrestrial flora and fauna was not considered. As a result, Cleanup Standards for relatively non-mobile chemicals are generally less stringent for deep soils than corresponding standards for shallow soils. For chemicals that are easily leached from soil or potentially volatilized to the air, groundwater and indoor-air protection concerns usually drive selection of the Cleanup Standard regardless of the depth of the contaminated soil.

The advantages and disadvantages of remediating deep soils to shallow soil criteria should be evaluated on a site-by-site basis, as discussed in Section 2.10. Such an evaluation may

help avoid concerns regarding future disturbance and reuse of deeper soils. Actions and/or controls that may be appropriate include (but not limited to):

- In-situ treatment technologies to render the waste immobile or prevent chemical reactions which generate additional waste streams;
- Other risk management measures to eliminate potential direct or indirect exposure;
- Direct field measurement and/or modeling to evaluate potential impacts to surrounding soils and indoor air due to vapor emissions; and
- Capping of shallow contaminated soil and other engineered controls used in place of full cleanup, although such controls are generally not allowed for properties that are to be used for single-family homes or properties where impact to surrounding soils, groundwater, surface water or culturally significant resources may occur.

The need to consider these actions at sites with contaminated soils situated more than three meters below the ground surface should be discussed with the EWMP.

2.6 Land Use

Land uses are categorized based on the assumed length, duration, and magnitude of potential human exposure and in compliance with the Tribal Land Use Policy Ordinance and Land Use Planning and Zoning policies and regulations. There are two sets of Cleanup Standards, one for the Unrestricted Use of the site in question and a second for Commercial/Industrial Use, as stated in Section 1.2. Also as explained in § 1.2, the EWMP requires compliance in the first instance with the Unrestricted Use Standards but recognizes that there are situations when commercial or industrial use of a site may be appropriate; in these instances, a waiver may be sought under § 3.1 for the application of the Commercial/Industrial Use Standards.

2.7 Threat to Surface Water Habitats

Protective values for freshwater/surface water are presented in Lookup Table D-2. These values consider the same set of environmental concerns as for groundwater (excluding potential impacts to indoor air), with the addition of standards for the potential bioaccumulation of chemicals in aquatic organisms and subsequent human consumption of these organisms.

For the purposes of the Cleanup Standards and Lookup Tables, it is assumed that contaminated or potentially contaminated groundwater at all sites could at some time migrate offsite and discharge into a body of surface water. This could occur due to the natural, downgradient migration of groundwater or hydrogeological properties influencing movement of groundwater to surface water, rivers, creeks, or streams in close proximity to waste sources or to human activities such as dewatering of construction sites or heavy irrigation practices. For several pesticides and heavy metals, including dieldrin, endrin, and endosulfan, aquatic habitat goals are more stringent than drinking water toxicity goals for humans. This is reflected in the final groundwater values listed in the Lookup Tables.

The groundwater protection values for potential impacts to aquatic habitats do not consider dilution of groundwater upon discharge to a body of surface water. Benthic flora and fauna communities situated below or at the groundwater/surface water interface are assumed to be exposed to the full concentration of chemicals in contaminated groundwater. Use of a generic dilution factor to adjust the surface water protection screening levels with respect to dilution of groundwater upon discharge to surface water was therefore not considered. Consideration of a dilution/attenuation factor and alternative groundwater protective value for the protection of surface water quality may be appropriate on a site-specific basis.

Consideration of surface water protection values for bioaccumulation concerns in groundwater investigations and cleanup actions may be warranted at sites where large plumes of contaminated groundwater threaten to cause long-term impacts to important aquatic habitats. The need for a more detailed study of potential groundwater impacts on surface water with respect to bioaccumulation of chemicals in aquatic organisms should be evaluated on a site-by-site basis. This may include the need for more stringent soil cleanup standards (to prevent additional leaching) and development of a more comprehensive site investigation and/or a risk assessment as described in Part 4.

The soil Cleanup Standards and groundwater protection values Tables do not directly address the protection of sediment quality. Site-specific concerns could include the accumulation and magnification of concentrations of highly sorptive chemicals in sediment over time due to long-term discharges of contaminated groundwater. This may be especially true for groundwater contaminated with highly sorptive (lipophilic) chemicals, including heavy petroleum products. Potential erosion and runoff of surface soils from contaminated sites may also need to be considered, particularly at sites contaminated with metals and pesticides that are situated near a sensitive body of surface water. The need for a more detailed, ecological investigation or risk assessment of impacts to sediment should be evaluated on a site-by-site basis and discussed with the EWMP.

Finally, consistent with § 2.2, the Lookup Tables with protective values are intended to complement rather than supersede the Tribal Water Quality Standards, Criteria and/or Cleanup Goals. In the event the Tribal Water Quality Department has Criteria and/or Standards that are more stringent, those numbers shall apply. Only in the event that the protective values presented herein are more stringent shall they be applied.

2.8 Screening for Vapor Intrusion Concerns

Volatile organic chemicals (VOCs) can volatilize from contaminated soil or groundwater and become concentrated in overlying buildings, impacting the quality of indoor air. In addition, VOCs can migrate through the soils, moving both in a horizontal and vertical direction and impacting receptors at off-site locations. Soil gas and groundwater protection values were developed for the purpose of estimating such concentrations and are incorporated into the Cleanup Standards.

Heating, ventilation and air conditioning (HVAC) systems, basements, strong winds, and other factors can exacerbate vapor intrusion problems by reducing internal air pressure and creating a vacuum effect that enhances the advective flow of vapors through building floors (e.g., US EPA 2003, CalEPA 2004b). For buildings with a slab-on-grade design, these factors can result in the direct flow of subsurface vapors into a building with little or no dilution beforehand. The vapors become diluted as they mix with fresh air being drawn in through the building's HVAC system or through open doors and windows (generally by a factor of 500 to 1,000 for residential buildings and higher for commercial/industrial buildings).

For buildings with a crawl-space design, subsurface vapors may be diluted as they diffuse into and mix air in the crawl space below the building floor. Additional mixing may or may not occur as the air from the crawl space is pulled into the building. Vapor transport through the building floor could be significantly elevated in comparison to slab-on-grade design buildings due to the operation of HVAC systems in poorly ventilated rooms (e.g., an unvented closet). This issue is still being evaluated. An initial review of published literature and site data suggests that ultimate soil gas-to-indoor air attenuation factors for buildings with crawl spaces can be very similar to slab-on-grade design buildings. The field of vapor intrusion investigations is still evolving. Appropriate investigation and risk assessment needs should be determined on a site-by-site basis.

2.8.1 Stepwise Approach to Vapor Intrusion Evaluation

The sequential collection and evaluation of groundwater or soil gas data and, if needed, indoor air data is the recommended approach to determine vapor intrusion migration. These data can be compared to protection values for vapor intrusion concerns presented in this document and areas of elevated concern can be quickly identified. The following approach is recommended (refer also to CalEPA 2004b):

- 1) Compare groundwater data to appropriate values for vapor intrusion concerns (see Table C-1); for sites with significant contamination, proceed directly to Step 2;
- 2) For areas where groundwater values for vapor intrusion concerns are approached or exceeded or sites where significant releases to the vadose zone have occurred, collect shallow soil gas samples immediately beneath (preferred) or adjacent to buildings and compare results to soil-gas values (Table C or Lookup Table C-2).
- 3) At buildings where soil-gas values for vapor intrusion concerns are approached or exceeded, further evaluate the need to carry out further studies (Section 2.8.3).

Note that site data should in general not be averaged over an area greater than the existing area of buildings for initial evaluation of vapor intrusion concerns.

The Cleanup Standards and Protective Values are based on scientific models for vapor intrusion into buildings as well as a growing body of data from actual field investigations.

2.8.2 Collection and Evaluation of Groundwater Data

Groundwater data should be collected at all sites where significant releases of VOCs may have occurred and compared to levels presented in this document (Lookup Table C-1, see also Lookup Table D-1). Vapor emission rates may be controlled by the concentration of VOCs in the uppermost part of the saturated zone. Sample data from this zone are preferable over data from monitoring wells when available. This is due to potential mixing effects in wells with long screens or with screens that do not placed in the upper portion of the saturated zone.

The groundwater protection values for vapor intrusion concerns are based on an assumed three-meter depth to groundwater. These values may not be adequately conservative for use at sites characterized by a shallower water table. The need to develop more site-specific values or proceed directly to soil gas sampling should be reviewed with EWMP. Imported fill material or disturbed native soils should be considered to be highly permeable in site-specific assessments unless measured vapor flow data into existing buildings indicate otherwise.

2.8.3 Collection and Evaluation of Soil Gas Data

Soil gas samples should be collected at sites where data suggest potentially significant vapor intrusion concerns. Collection procedures should be determined in consultation with the EWMP and only after the appropriate work plans have been submitted and approved. Soil gas samples should be collected over the core of the soil contamination and/or groundwater plume and in nearby areas of concern (e.g., residential areas, nearby buildings, utility corridors, culturally significant locations, etc.). Ideally, samples should be collected immediately beneath the foundations of existing buildings (e.g. sub-slab). Samples should be collected from areas immediately adjacent to buildings (preferably paved) if it is impractical to collect sub-slab samples. In areas away from buildings or where buildings are to be constructed in the future, samples should be collected from a depth of 3 m (10 feet) below ground surface. Soil gas samples collected from depths less than 3 m are considered unreliable due to the increased potential to draw in ambient, surface air and may not provide an accurate measure of contaminant mass. If site-specific modeling of vapor flow rates or indoor air impacts is to be carried out, the collection of additional soil geotechnical data should be considered (soil grain-size analysis, moisture content, and fraction organic carbon).

The use of lab-based, soil vapor permeability data to override the default vapor flux rate of 5 liters per minute per 100 m² of ground floor area used in the US EPA and DTSC models is discouraged. These tests often do not adequately take into account enhanced permeability due to soil heterogeneities, soil fractures, relict root structures, shallow fill material, disturbance during redevelopment, and other types of potential secondary permeability. Data collected from soils within 1.5 m of the ground surface and well above the water table are especially pertinent in the models. The collection of deeper soil gas samples and soil-type data is necessary in evaluating the lateral and vertical extent of VOCs in the subsurface. Both subslab sample data and shallow soil gas data (i.e., <1.5 m bgs) should be compared to the soil gas cleanup levels presented in Lookup Table E. Where cleanup standards are approached or exceeded, the need to carry out additional investigations or risk assessments should be evaluated in consultation with the EWMP.

2.8.4 Soil Gas and Low-Permeable Soils

At sites where soil gas samples cannot be collected using traditional methods due to tight soil conditions (e.g., wet, clayey soils), other approaches should be attempted. In many cases, simply moving the collection probe over a few feet from the initial location will address the problem(s). If problems still persist, the installation of temporary soil vapor probes encased in permeable sand packs and capped with a bentonite clay mixture can be considered (CalEPA 2002). The diameter and depth of the vapor probe borehole should be adjusted to allow sufficient pore space for the collection of soil gas samples. Adequate time (generally several weeks) should be allowed for VOCs in the surrounding clays to equilibrate with soil gas in the vapor probe sand pack. At sites where groundwater is contaminated with VOCs and the collection of soil gas data is not possible, the owner or operator should consult with the EWMP.

2.8.5 Collection and Evaluation of Indoor Air Data

The collection of indoor data will be necessary to further evaluate vapor intrusion concerns in some cases. The collection of indoor air data in the absence of soil gas and, if applicable, crawl space data is not recommended; as such data are critical in determining the source of any VOCs identified in indoor air. Crawl space data should be compared directly to indoor air data. Ultimate actions required at a given site should be determined on a case-by-case basis in coordination with the EWMP and/or other appropriate Tribal Departments. Active mitigation of indoor air impacts may be recommended (or even required) at sites where a need to reduce exposure of individuals is desired even though health risk objectives noted above are not exceeded.

If vapor intrusion concerns are primarily for future buildings, then remediation of VOC impacts prior to construction should be considered. If this is not feasible (e.g., impacts due to continuing offsite source) then engineered controls to mitigate vapor intrusion concerns should be incorporated into future building designs. The scope and oversight of these controls should be determined on a site-specific basis in coordination with the EWMP and/or other appropriate Tribal Departments.

2.9 Cumulative Risks at Sites with Multiple Chemicals of Concern

Risks posed by direct exposure to multiple chemicals with similar health effects are considered to be additive or cumulative. For example, the total risk of cancer posed by the presence of two carcinogenic chemicals in soil is the sum of the risk posed by each individual chemical. The same is true for chemicals that cause noncarcinogenic health effects. A summary of example target health effects for the chemicals listed in the lookup tables is provided in Lookup Table J.

Use of Cleanup Standards for single chemicals is limited to the extent that the Cleanup Standards remain protective of human health should other chemicals with similar health effects

also be present. Soil Cleanup Standards are considered to be adequate for use at sites where no more than three carcinogenic chemicals or five chemicals with similar noncarcinogenic health effects are present. This limitation is based on a combination of conservative exposure assumptions and target risk factors in direct-exposure models.

2.10 Framework for Site Investigation

Site Investigations should serve as stand-alone documents that provide a good summary of environmental impacts at a site and assess the threats posed to human health and the environment from these impacts. Information on each of the topics listed below should be addressed in a report that presents the risks from the site. Together, this information is intended to provide a basic conceptual model of site conditions. The level of detail required for each topic will vary depending on site-specific considerations.

1. Summarize Past, Current and Anticipated Future Site Activities and Uses:

- Describe past and current site uses and activities;
- Describe foreseeable future site uses and activities. (Always include a comparison of site data to Cleanup Standards for unrestricted land use to evaluate need for formal waivers, pursuant to Part 3).

2. Summary of Site Investigation:

- Identify all types of contaminated media;
- Identify all sources of chemical releases;
- Identify all chemicals of concern;
- Identify magnitude and extent of impacts that exceed Cleanup Standards to extent feasible and applicable (include maps of site with iso-concentration contours for soil and groundwater);
- Identify nearby groundwater extraction wells, bodies of surface water and other potentially sensitive ecological habitats;
- Ensure data are representative of site conditions.

3. Summarize Appropriateness of Use of Cleanup Standards and Lookup Tables:

- Do Cleanup Standards exist for all chemicals of concern?
- Does the site have a high public profile and warrant a fully documented, detailed environmental risk assessment?
- Do soil and groundwater conditions at the site differ significantly from those assumed in development of the Lookup Tables (e.g., low pH at mine sites)?
- Do impacts pose a heightened threat to sensitive ecological habitats (e.g., presence of endangered or protected species, culturally sensitive area)?
- Have more than three carcinogens or five chemicals with similar noncarcinogenic health effects been identified?
- Other issues as applicable to the site.

4. Soil and Groundwater Categorization:

- State the determined beneficial use of contaminated or potentially contaminated groundwater beneath the site; discuss the actual, likely beneficial use of groundwater based on measured or assumed quality of the groundwater and the hydrogeologic nature of the soil or bedrock containing the groundwater.
- Characterize the soil type(s) and location of contaminated soil as applicable to the Lookup Tables (e.g., soil stratigraphy, soil texture and permeability, depth to and thickness of contaminated soil, etc.).

· 5. Exposure Point Concentrations:

- Identify maximum concentrations of chemicals present in contaminated media.
- Describe how alternative exposure point concentrations were determined (e.g., 95 percent UCLs), if proposed, and provide supporting data. For vapor intrusion concerns, groundwater, soil and/or soil gas data should not be averaged over the floor space area of existing or anticipated buildings.
- Discuss the need to evaluate groundwater data with respect to surface water standards for potential bioaccumulation of chemicals in aquatic organisms due to the size of the plume, the proximity of the plume to a body of surface water and the potential for minimal dilution of groundwater upon discharge to surface water (see § 2.7).
- Discuss how background concentrations of chemicals were determined,

6. Selection of Cleanup Standards and Comparison to Site Data:

- Summarize how Cleanup Standards were selected with respect to the information provided above and additional assumptions as applicable.
- Compare site data to the selected summary Cleanup Standards and discuss general results.
- Compare site data to detailed Lookup Tables for individual environmental concerns and discuss specific, potential environmental concerns present at site.

7. Conclusions:

Describe the extent of soil and groundwater impacts above Cleanup Standards, using maps and cross sections as necessary.

- Discuss if a condition of potential risk to human health and the environment exists at the site.
- Discuss if a site specific risk assessment is warranted at the site.
- Present a summary of recommended future actions proposed to address environmental concerns at the site.
- Discuss the need to request a waiver as detailed in Part 3.

The above list is not intended to be exhaustive or to constitute an exact outline required for all Site Investigations. Requirements for completion of an adequate site investigation should be discussed with the EWMP.

2.11 Evaluation of Petroleum Contamination

The potential contamination of soil, water, and air by petroleum mixtures is to be evaluated in terms of the presence of both Total Petroleum Hydrocarbons (“TPH”) and the target indicator chemicals for a given petroleum mixture. Protective values for both the petroleum mixtures and the individual target indicator chemicals are found in the Lookup Tables. Indicator chemicals typically recommended for petroleum mixtures include (after Cal/EPA 1996a and 1996b):

A. Aromatic Compounds (Indicating, Primarily Gasoline and Middle Distillates)

- Benzene
- Ethylbenzene
- Toluene
- Xylene

B. Fuel Additives (Indicating, Primarily Gasoline)

- MTBE
- Other oxygenates

C. Polycyclic Aromatic Compounds (Indicating, Primarily Middle Distillates and Residual Fuels)

- Acenaphthene
- Acenaphthylene
- Anthracene
- Benzo(a)anthracene
- Benzo(b)fluoranthene
- Benzo(g,h,i)perylene
- Benzo(a)pyrene
- Benzo(k)fluoranthene
- Chrysene
- Dibenz(a,h)anthracene
- Fluoranthene
- Fluorene
- Indeno(1,2,3-c,d)pyrene
- Methyl-naphthalene (1- and 2-)
- Naphthalene
- Phenanthrene
- Pyrene

The middle distillates petroleum mixture includes diesel fuel kerosene, Stoddard Solvent, home heating fuel, jet fuel, and the like. Residual fuels include heavy petroleum products such as bunker fuel (No. 6 fuel oil), lubricating oils, grease, waste oils, and asphalts. Soil and groundwater contaminated by releases of waste oil may also require testing for heavy metals and chemicals such as chlorinated solvents and polychlorinated biphenyls (“PCBs”). (The Lookup Tables present protective values for these chemicals.) Tri-methylbenzenes, butylbenzenes, methyl-naphthalenes, and other common constituents of petroleum products

(especially gasoline) are sometimes reported separately in analyses of contaminated soil and groundwater. In general, however, these chemicals should be collectively evaluated under the pertinent TPH and do not need to be evaluated individually.

2.12 TSCA Cleanup Levels for PCBs

The treatment, storage, and disposal of PCBs are regulated under the federal Toxic Substances Control Act (“TSCA”) and 40 C.F.R. Part 761, which are administered by EPA. If PCBs are found at a site, TSCA and the regulations must be consulted to determine their applicability and to ensure that the appropriate notifications are provided to and approvals obtained from EPA. *See generally* USEPA, Guidance on Remedial Actions for Superfund Sites with PCB Contamination, (1990), *available at* <http://www.epa.gov/superfund/policy/remedy/pdfs/540g-90007-s.pdf>.¹³

¹³ *See* <http://www.epa.gov/epawaste/hazard/tsd/pcbs/index.htm> for more information on PCB regulations and guidance. For information specific to USEPA Region 10, *see* [http://yosemite.epa.gov/R10/OWCM.NSF/webpage/Polychlorinated+Biphenyls+\(PCBs\)+Homepage?OpenDocument](http://yosemite.epa.gov/R10/OWCM.NSF/webpage/Polychlorinated+Biphenyls+(PCBs)+Homepage?OpenDocument).

3 Petitions for Alternate Standards or Waiver

3.1 Petition to Use Commercial/Industrial Cleanup Standards

- (a) Pursuant to WMA § 605(D)(2), an owner or operator of a facility at a site subject to cleanup may petition the EWMP for permission to apply the Commercial/Industrial Use Cleanup Standards to the site instead of the Unrestricted Use Standards. The procedures set forth in WMA § 701(A)-(B) shall apply to such petitions, except that a grant of the petition shall be based on the factors set forth in subsection (b) of this section and the required contents of the application shall be modified accordingly from those set forth in WMA § 701(A).
- (b) A grant of the petition shall be based on a demonstration that:
 - (1) in light of land-use planning documents, zoning laws, leases, or other similar evidence, the site in question will be used only for commercial or industrial purposes for the foreseeable future;
 - (2) there are no traditional or cultural resources at or in close proximity to the site that may be adversely affected by application of the Commercial/Industrial Use Standards instead of the Unrestricted Use Standards; and
 - (3) the release of any waste, pollutant, or contaminant, as those terms are defined in WMA § 105, will not migrate beyond the boundaries of the site, for example through leaching into groundwater, , discharges to surface water either directly or indirectly through groundwater discharging to surface water, being suspended in dust, or by any other means.
- (c) If the petition to use Commercial/Industrial Cleanup Standards is granted, it must provide for creating (if necessary) and maintaining restrictions on the use of the site to ensure that it is used in the foreseeable future only for commercial/industrial purposes, and not for residential or other unrestricted uses.
- (d) The EWMP shall obtain the concurrence of the Land Use Planning Commission (“LUPC”) before making a determination that the requirements of subsections (b) (1) and (c) are satisfied.
- (e) The EWMP may provide, by regulation, for processing fees to be included with the petition.

3.2 Petition for Waiver from Cleanup Standards Due to Technical Impracticability

- (a) Pursuant to WMA § 605(D)(2), an owner or operator of a facility at a site subject to cleanup may petition the EWMP for a waiver to apply one or more cleanup standards other than the Unrestricted Use or Commercial/Industrial Use Cleanup Standards due to technical impracticability. The procedures set forth in WMA § 701(A)-(B) shall apply to such petitions, except that a grant of the petition shall be based on the factors set forth in subsection (b) of this section and the required contents of the application shall be modified accordingly from those set forth in WMA § 701(A). Petitions for waiver of Cleanup Standards at only a portion of the site in question, and that propose alternative standards that are as close as practicable to the Cleanup Standards, will be favored.
- (b) The EWMP will grant a petition for a waiver under this section if it finds that:
 - (1) Appropriate remediation technology has been attempted for an amount of time sufficient to evaluate whether it can reliably achieve the Cleanup Standards at issue. At a minimum, a claim of technical impracticability must be supported by two consecutive years of quarterly site-monitoring data showing that the degree of contamination is leveling or has leveled off and no other remediation method could appropriately achieve a reduction in contamination;
 - (2) There is no reasonable relationship between the economic and social costs that would be incurred and the benefits that would be obtained by continuing to attempt to achieve the Cleanup Standards in question, once the burden in paragraph (1) of this subsection has been met; and
 - (3) The proposed alternative standards are technically achievable, are protective of human health and the environment, and do not violate applicable federal standards. In no case may the EWMP approve alternative cleanup standards that violate applicable federal requirements unless permission has been obtained from the relevant federal agencies to deviate from those requirements.
- (c) Failure to achieve the Cleanup Standards because of inadequate system design or operation or unsuitability of the technology for site conditions shall not be considered sufficient justification for a waiver under this section.
- (d) The role of cost in a determination of technical infeasibility is subordinate to the goal of ensuring protection of human health and the environment, and in some cases high costs may be appropriate.
- (e) The grant of a technical impracticability waiver under this section is intended to be as identical as possible to a grant of a technical impracticability waiver under §

121(d)(4)(C) of CERCLA, and EPA guidance, policies, and precedents interpreting that provision of CERCLA shall guide implementation of this section.

- (f) The EWMP may provide, by regulation, for processing fees to be submitted together with the petition for a waiver.

3.3 Judicial Review

Any aggrieved person seeking to challenge a final decision of the EWMP regarding a petition for a waiver pursuant to § 3.1 or 3.2 is entitled to judicial review in Tribal Court pursuant to WMA § 902.

4 Site-Specific Standards

The EWMP will promulgate procedures for developing site-specific standards as part of the Shoshone-Bannock Waste Response Plan (“WRP”) promulgated pursuant to WMA § 603. The WRP, and thus the procedures for conducting site-specific risk assessments, will be subject to the rulemaking provisions of WMA § 901. This Part provides a general overview of the types of site conditions that may lead the EWMP to require or to approve an owner’s or an operator’s request for preparation of site-specific standards. It also describes two types of site-specific environmental risk assessments that may be conducted, depending on the degree of site evaluation required, and discusses elements of the conceptual site model to be used in conducting site-specific risk assessments.

Notwithstanding the preceding paragraph, it is a requirement of these Cleanup Standards that soils that exhibit the characteristics of ignitability or reactivity, as those terms are defined under RCRA and federal regulations implementing RCRA, must be treated to eliminate those characteristics, or else the soils must be removed from the site.

4.1 Site Considerations

The EWMP may determine, either on its own initiative or at the request of the owner or operator, that site conditions are such as to render inappropriate the use of some or all of the Cleanup Standards for some or all portions of the site, and to require preparation of alternative, site-specific standards in those instances.

Examples of site conditions that may warrant site-specific standards include those listed in § 1.4. Others might include the following:

- Sites where impacts pose increased threats to sensitive ecological habitats, such as sites adjacent to wetlands or streams, or areas where cultural resources are present;
- Sites where physical conditions substantially differ from those assumed in the development of the Cleanup Standards (such sites may include, for example, mine sites or landfills with high or low pH); and
- Sites with contaminants for which Cleanup Standards have not been developed.

Depending on the extent of modifications needed to the Cleanup Standards, a Type 1 or a Type 2 site-specific risk assessment may be selected, as described further below. Under either type of assessment, however, the EWMP shall ensure that human health, natural and cultural resources, and the environment will be adequately protected, and will minimize deviations from the Cleanup Standards to the extent possible while taking into account specific site conditions. Site-specific standards will be designed so as to meet a cancer risk level of 10^{-6} and a non-cancer hazard quotient of 0.2, the same as the Cleanup Standards. As in the case of waivers from the

Cleanup Standards under § 3.2, the EWMP shall not approve site-specific cleanup standards that violate applicable federal requirements unless permission has been obtained from the relevant federal agencies to deviate from those requirements.

4.2 Type 1 Site-Specific Risk Assessments

Under a Type 1 site-specific risk assessment, selected components of the assumptions on which the Cleanup Standards are based are modified to reflect site-specific data or considerations. For example, the indoor air exchange rate might be adjusted if it is shown to be more or less than assumed in the relevant Cleanup Standards, but the rest of the assumptions in the Cleanup Standards may be appropriate vis-à-vis the site. This situation would result in limited revisions to the Cleanup Standards, with the remaining standards continuing to be applicable.

This approach is based on the Tier 2 environmental risk assessments in the ESLs, and provides a relatively rapid and cost-effective option for preparing site-specific standards. Replacing only targeted components of the Cleanup Standards reduces the need to prepare and justify an independent, detailed risk assessment, which greatly reduces the time and cost incurred by both the regulated business and the EWMP.

4.3 Type 2 Site-Specific Risk Assessments

Under a Type 2 site-specific risk assessment, alternative models and modeling assumptions would be used and fully justified to develop site-specific cleanup standards. Portions of the Cleanup Standards may still be retained, but significantly greater modifications would be required than under the Type 1 assessment. This approach is based on the Tier 3 environmental risk assessments in the ESLs.

4.4 Developing a Conceptual Site Model

If the EWMP determines, pursuant to Section 4.1 and procedures laid out in the WRP, that site-specific standards are warranted, either in whole or in part, a conceptual site model (“CSM”) will be required as part of the environmental risk assessment performed for the site. The CSM presents information about site conditions, likely contaminant source areas, exposure pathways, and potential receptors. A CSM summarizes information about site conditions in a schematic presentation in terms of: 1) primary sources (e.g., leaking tanks); 2) secondary sources (e.g., contaminated soil); 3) contaminant transport mechanisms (e.g., volatilization and intrusion into buildings); 4) contaminated exposure media (e.g., indoor air); and 5) potentially complete exposure pathways. A CSM also can be used to provide a rationale for additional site investigation. The level of detail required in a conceptual site model will vary from site to site. The presentation and scope of the model should be discussed with the EWMP. The conceptual site model should be continually updated to reflect new information.

Additional information regarding the preparation of CSMs is provided in USEPA, *Preliminary Remediation Goals* (2004); the USEPA Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, Interim Final (USEPA 1988); and SFBWQCB, *Screening for Environmental Concerns at Site with Contaminated Soil and Water* 2-24 to 2-27 (2003).

A schematic of tribal exposure pathways is presented in Figure 2. As noted in § 1.1, the Tribes' and their members' well-being is integrally related to the environment, in a way not typically accounted for in most exposure evaluation models. In addition, typical exposure evaluation models reflect exposures received in urban and suburban settings and do not consider the extent of tribal environmental contact. Although contemporary resource uses may not be the same as traditional resource uses, the Tribes' goal is to restore the health of tribal individuals and community. Figure 2 is based on the knowledge that, for Native Americans,

[T]he quality of the socio-cultural and eco-cultural landscapes is very important, as is the quality of individual natural resources or ecosystem integrity. . . .
[I]ndividual and collective well being is derived from membership in a healthy community that has access to, and utilization of, ancestral lands and traditional resources. This wellness stems from and is enhanced by having the opportunity and ability to live within traditional community activities and values. . . .

Therefore, if the link between a person and his/her environment is severed through the introduction of contamination or physical or administrative disruption, the person's health suffers, and the well being of the entire community is affected.

Harper, Barbara L., *et al. Traditional Tribal Subsistence Exposure Scenario and Risk Assessment Guidance Manual* 11-12 (2007).

Performing a tribally relevant risk assessment means more than simply performing an ecological risk assessment with culturally important species and/or using a human exposure scenario that includes exposures received during cultural activities. It means developing an exposure scenario that reflects the lifestyle [that] treaties (or their equivalent) were designed to protect.

These tribal factors therefore should be considered in the CSM.

4.5 Guidance on Environmental Risk Assessments

Guidance on the preparation of site-specific baseline environmental risk assessments is provided in the following references:

- Harper, Barbara L., *et al.* *Traditional Tribal Subsistence Exposure Scenario and Risk Assessment Guidance Manual.* (Aug. 2007.)
- Johnson, P.C., *et al.* *Assessing the Significance of Subsurface Contaminant Vapor Migration to Enclosed Spaces.* (Dec. 1998.)
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Additionally, Figures 2 - 5 and Tables 1 – 3 present typical traditional activities and exposure considerations to be considered in developing a tribal risk assessment.

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LOOKUP TABLES

**Table A. Tribal Cleanup Standards
Shallow Soils (<3m bgs)**

Chemical	¹ Shallow Soil	
	² Residential Land Use (mg/kg)	Commercial/Industrial Land Use Only (mg/kg)
Acenaphthene	1.6E+01	1.6E+01
Acenaphthylene	1.3E+01	1.3E+01
Acetone	5.0E-01	5.0E-01
Aldrin	3.2E-02	1.3E-01
Anthracene	2.8E+00	2.8E+00
Antimony	6.3E+00	4.0E+01
Arsenic	3.9E-01	1.6E+00
Barium	7.5E+02	1.5E+03
Benzene	4.4E-02	4.4E-02
Benzo(a)anthracene	3.8E-01	1.3E+00
Benzo(b)fluoranthene	3.8E-01	1.3E+00
Benzo(k)fluoranthene	3.8E-01	1.3E+00
Benzo(g,h,i)perylene	2.7E+01	2.7E+01
Benzo(a)pyrene	3.8E-02	1.3E-01
Beryllium	4.0E+00	8.0E+00
1,1-Biphenyl	6.5E-01	6.5E-01
Bis(2-chloroethyl) ether	4.0E-04	4.0E-04
Bis(2-chloroisopropyl) ether	1.5E-04	1.5E-04
Bis(2-ethylhexyl) phthalate	3.5E+01	1.2E+02
Boron	1.6E+00	2.0E+00
Bromodichloromethane	5.7E-01	1.3E+00
Bromoform (Tribromomethane)	2.2E+00	2.2E+00
Bromomethane	3.9E-01	3.9E-01
Cadmium	1.7E+00	7.4E+00
Carbon tetrachloride	2.0E-02	4.4E-02
Chlordane	4.4E-01	1.7E+00
p-Chloroaniline	5.3E-02	5.3E-02
Chlorobenzene	1.5E+00	1.5E+00
Chloroethane	8.5E-01	8.5E-01
Chloroform	6.8E-01	1.5E+00
Chloromethane	6.4E+00	6.4E+00
2-Chlorophenol	1.2E-02	1.2E-02
Chromium (total)		
Chromium III	7.5E+02	7.5E+02
Chromium VI	8.0E+00	8.0E+00
Chrysene	2.3E+01	2.3E+01
Cobalt	4.0E+01	8.0E+01
Copper	2.3E+02	2.3E+02
Cyanide	3.6E-03	3.6E-03
Dibenz(a,h)anthracene	6.2E-02	2.1E-01
Dibromochloromethane	7.6E+00	8.3E+00
1,2-dibromo-3-chloropropane	4.5E-03	4.5E-03
1,2-Dibromoethane	3.3E-04	3.3E-04
1,2-Dichlorobenzene	1.1E+00	1.1E+00
1,3-Dichlorobenzene	7.4E+00	7.4E+00
1,4-Dichlorobenzene	5.9E-01	5.9E-01

**Table A. Tribal Cleanup Standards
Shallow Soils (<3m bgs)**

Chemical	¹ Shallow Soil	
	² Residential Land Use (mg/kg)	Commercial/Industrial Land Use Only (mg/kg)
3,3-Dichlorobenzidine	7.7E-03	7.7E-03
Dichlorodiphenyldichloroethane (DDD)	2.4E+00	1.0E+01
Dichlorodiphenyldichloroethene (DDE)	1.7E+00	4.0E+00
Dichlorodiphenyltrichloroethane (DDT)	1.7E+00	4.0E+00
1,1-Dichloroethane	2.0E-01	2.0E-01
1,2-Dichloroethane	4.5E-03	4.5E-03
1,1-Dichloroethene	1.0E+00	1.0E+00
<i>cis</i> -1,2-Dichloroethene	1.9E-01	1.9E-01
<i>trans</i> -1,2-Dichloroethene	6.7E-01	6.7E-01
2,4-Dichlorophenol	3.0E-01	3.0E-01
1,2-Dichloropropane	1.2E-01	1.2E-01
1,3-Dichloropropene	5.9E-02	5.9E-02
Dieldrin	2.3E-03	2.3E-03
Diethyl phthalate	3.5E-02	3.5E-02
Dimethyl phthalate	3.5E-02	3.5E-02
2,4-Dimethylphenol	6.7E-01	6.7E-01
2,4-Dinitrophenol	4.2E-02	4.2E-02
2,4-Dinitrotoluene	3.9E-04	3.9E-04
1,4-Dioxane	1.8E-03	1.8E-03
Dioxin (2,3,7,8-TCDD)	4.5E-06	1.8E-05
Endosulfan	4.6E-03	4.6E-03
Endrin	6.5E-04	6.5E-04
Ethylbenzene	2.3E+00	3.3E+00
Fluoranthene	4.0E+01	4.0E+01
Fluorene	8.9E+00	8.9E+00
Heptachlor	1.3E-02	1.3E-02
Heptachlor epoxide	1.4E-02	1.4E-02
Hexachlorobenzene	3.4E-01	1.3E+00
Hexachlorobutadiene	2.2E+00	2.2E+00
γ -Hexachlorocyclohexane (Lindane)	9.8E-03	9.8E-03
Hexachloroethane	3.0E+00	3.0E+00
Indeno(1,2,3-c,d)pyrene	6.2E-01	2.1E+00
Lead	2.0E+02	7.5E+02
Mercury (elemental)	1.3E+00	1.0E+01
Methoxychlor	1.9E+01	1.9E+01
Methylene chloride	7.7E-02	7.7E-02
Methyl ethyl ketone	3.9E+00	3.9E+00
Methyl isobutyl ketone	2.8E+00	2.8E+00
Methyl mercury	1.2E+00	1.2E+01
2-Methylnaphthalene	2.5E-01	2.5E-01
<i>tert</i> -Butyl methyl ether	2.3E-02	2.3E-02
Molybdenum	4.0E+01	4.0E+01
Naphthalene	1.3E+00	2.8E+00
Nickel	1.5E+02	1.5E+02
Pentachlorophenol	3.0E+00	5.0E+00
Perchlorate	1.1E+01	1.4E+02

**Table A. Tribal Cleanup Standards
Shallow Soils (<3m bgs)**

	¹ Shallow Soil	
Chemical	² Residential Land Use (mg/kg)	Commercial/Industrial Land Use Only (mg/kg)
Phenanthrene	1.1E+01	1.1E+01
Phenol	7.6E-02	7.6E-02
Polychlorinated biphenyls (PCBs)	2.2E-01	7.4E-01
Pyrene	8.5E+01	8.5E+01
Selenium	1.0E+01	1.0E+01
Silver	2.0E+01	4.0E+01
Styrene	1.5E+00	1.5E+00
<i>tert</i> -Butyl alcohol	7.5E-02	7.5E-02
1,1,1,2-Tetrachloroethane	2.4E-02	2.4E-02
1,1,2,2-Tetrachloroethane	1.8E-02	1.8E-02
Tetrachloroethene	3.7E-01	7.0E-01
Thallium	1.3E+00	1.6E+01
Toluene	2.9E+00	2.9E+00
Toxaphene	4.2E-04	4.2E-04
TPH (gasolines)	8.3E+01	8.3E+01
TPH (middle distillates)	8.3E+01	8.3E+01
TPH (residual fuels)	3.7E+02	2.5E+03
1,2,4-Trichlorobenzene	1.5E+00	1.5E+00
1,1,1-Trichloroethane	7.8E+00	7.8E+00
1,1,2-Trichloroethane	7.0E-02	7.0E-02
Trichloroethene	4.6E-01	4.6E-01
2,4,5-Trichlorophenol	1.8E-01	1.8E-01
2,4,6-Trichlorophenol	2.3E-01	2.3E-01
Vanadium	1.6E+01	2.0E+02
Vinyl chloride	2.2E-02	4.7E-02
Xylenes	2.3E+00	2.3E+00
Zinc	6.0E+02	6.0E+02

Notes:

1. Shallow soils defined as soils less than or equal to 3 meters (approximately 10 feet) below ground surface.
 2. Category "Unrestricted Land Use" generally considered adequate for other sensitive uses.
 3. Assumes potential discharge of groundwater into a freshwater, marine or estuary surface water system.
- Soil standards are intended to address direct-exposure, groundwater protection, ecologic (urban areas) and nuisance concerns under noted land-use scenarios. **Soil gas data should be collected for additional evaluation of potential indoor-air impacts at sites with areas of VOC-contaminated soil.**
- Groundwater intended to be address drinking water, surface water, indoor-air and nuisance concerns. **Use in conjunction with soil gas protection values to more closely evaluate potential impacts to indoor-air if groundwater screening levels for this concern approached or exceeded.**
- Aquatic habitat goals for bioaccumulation concerns not considered in selection of groundwater goals.
- TPH -Total Petroleum Hydrocarbons. TPH standard must be used in conjunction with standards for related chemicals (e.g., BTEX, PAHs, oxidizers, etc.).
- All water associated with the Snake River Plain Aquifer is considered to be a drinking water source.

**Table B. Tribal Cleanup Standards
Deep Soils (>3m bgs)**

Chemical	¹ Deep Soil	
	² Residential Land Use (mg/kg)	Commercial/ Industrial Land Use Only (mg/kg)
Acenaphthene	1.6E+01	1.6E+01
Acenaphthylene	1.3E+01	1.3E+01
Acetone	5.0E-01	5.0E-01
Aldrin	1.5E+00	1.5E+00
Anthracene	2.8E+00	2.8E+00
Antimony	3.1E+02	3.1E+02
Arsenic	1.5E+01	1.5E+01
Barium	2.5E+03	2.6E+03
Benzene	4.4E-02	4.4E-02
Benzo(a)anthracene	1.2E+01	1.2E+01
Benzo(b)fluoranthene	1.5E+01	1.5E+01
Benzo(k)fluoranthene	2.7E+00	2.7E+00
Benzo(g,h,i)perylene	2.7E+01	2.7E+01
Benzo(a)pyrene	1.5E+00	1.5E+00
Beryllium	9.8E+01	9.8E+01
1,1-Biphenyl	6.5E-01	6.5E-01
Bis(2-chloroethyl) ether	4.0E-04	4.0E-04
Bis(2-chloroisopropyl) ether	1.5E-04	1.5E-04
Bis(2-ethylhexyl) phthalate	7.8E+02	7.8E+02
Boron	6.3E+04	6.3E+04
Bromodichloromethane	1.9E+00	1.9E+00
Bromoform (Tribromomethane)	2.2E+00	2.2E+00
Bromomethane	3.9E-01	3.9E-01
Cadmium	3.9E+01	3.9E+01
Carbon tetrachloride	1.1E-01	1.1E-01
Chlordane	1.5E+01	1.5E+01
<i>p</i> -Chloroaniline	5.3E-02	5.3E-02
Chlorobenzene	1.5E+00	1.5E+00
Chloroethane	8.5E-01	8.5E-01
Chloroform	2.1E+00	2.1E+00
Chloromethane	6.4E+00	6.4E+00
2-Chlorophenol	1.2E-02	1.2E-02
Chromium (total)	2.5E+03	5.0E+03
Chromium III	2.5E+03	5.0E+03
Chromium VI	5.3E-01	5.3E-01
Chrysene	2.3E+01	2.3E+01
Cobalt	9.4E+01	9.4E+01
Copper	2.5E+03	5.0E+03
Cyanide	3.6E-03	3.6E-03
Dibenz(a,h)anthracene	2.4E+00	2.4E+00
Dibromochloromethane	8.3E+00	8.3E+00
1,2-dibromo-3-chloropropane	4.5E-03	4.5E-03
1,2-Dibromoethane	3.3E-04	3.3E-04
1,2-Dichlorobenzene	1.1E+00	1.1E+00
1,3-Dichlorobenzene	7.4E+00	7.4E+00
1,4-Dichlorobenzene	5.9E-01	5.9E-01
3,3-Dichlorobenzidine	7.7E-03	7.7E-03

**Table B. Tribal Cleanup Standards
Deep Soils (>3m bgs)**

Chemical	¹ Deep Soil	
	² Residential Land Use (mg/kg)	Commercial/ Industrial Land Use Only (mg/kg)
Dichlorodiphenyldichloroethane (DDD)	1.2E+02	1.2E+02
Dichlorodiphenyldichloroethene (DDE)	8.7E+01	8.7E+01
Dichlorodiphenyltrichloroethane (DDT)	4.3E+00	4.3E+00
1,1-Dichloroethane	2.0E-01	2.0E-01
1,2-Dichloroethane	4.5E-03	4.5E-03
1,1-Dichloroethene	1.0E+00	1.0E+00
<i>cis-1,2-Dichloroethene</i>	1.9E-01	1.9E-01
<i>trans-1,2-Dichloroethene</i>	6.7E-01	6.7E-01
2,4-Dichlorophenol	3.0E-01	3.0E-01
1,2-Dichloropropane	1.2E-01	1.2E-01
1,3-Dichloropropene	5.9E-02	5.9E-02
Dieldrin	2.3E-03	2.3E-03
Diethyl phthalate	3.5E-02	3.5E-02
Dimethyl phthalate	3.5E-02	3.5E-02
2,4-Dimethylphenol	6.7E-01	6.7E-01
2,4-Dinitrophenol	4.2E-02	4.2E-02
2,4-Dinitrotoluene	3.9E-04	3.9E-04
1,4-Dioxane	1.8E-03	1.8E-03
Dioxin (2,3,7,8-TCDD)	2.3E-04	2.3E-04
Endosulfan	4.6E-03	4.6E-03
Endrin	6.5E-04	6.5E-04
Ethylbenzene	3.3E+00	3.3E+00
Fluoranthene	6.0E+01	6.0E+01
Fluorene	8.9E+00	8.9E+00
Heptachlor	1.3E-02	1.3E-02
Heptachlor epoxide	1.4E-02	1.4E-02
Hexachlorobenzene	1.6E+01	1.6E+01
Hexachlorobutadiene	2.2E+00	2.2E+00
γ -Hexachlorocyclohexane (Lindane)	9.8E-03	9.8E-03
Hexachloroethane	3.0E+00	3.0E+00
Indeno(1,2,3-c,d)pyrene	1.3E+01	1.3E+01
Lead	7.5E+02	7.5E+02
Mercury (elemental)	5.8E+01	5.8E+01
Methoxychlor	1.9E+01	1.9E+01
Methylene chloride	7.7E-02	7.7E-02
Methyl ethyl ketone	3.9E+00	3.9E+00
Methyl isobutyl ketone	2.8E+00	2.8E+00
Methyl mercury	4.1E+01	4.1E+01
2-Methylnaphthalene	2.5E-01	2.5E-01
<i>tert-Butyl methyl ether</i>	2.3E-02	2.3E-02
Molybdenum	2.5E+03	3.9E+03
Naphthalene	3.4E+00	3.4E+00
Nickel	2.6E+02	2.6E+02
Pentachlorophenol	9.9E+01	9.9E+01
Perchlorate	5.4E+02	5.4E+02
Phenanthrene	1.1E+01	1.1E+01
Phenol	7.6E-02	7.6E-02

**Table B. Tribal Cleanup Standards
Deep Soils (>3m bgs)**

Chemical	¹ Deep Soil	
	² Residential Land Use (mg/kg)	Commercial/Industrial Land Use Only (mg/kg)
Polychlorinated biphenyls (PCBs)	6.3E+00	6.3E+00
Pyrene	8.5E+01	8.5E+01
Selenium	2.5E+03	3.9E+03
Silver	2.5E+03	3.9E+03
Styrene	1.5E+00	1.5E+00
<i>tert-Butyl alcohol</i>	7.5E-02	7.5E-02
1,1,1,2-Tetrachloroethane	2.4E-02	2.4E-02
1,1,2,2-Tetrachloroethane	1.8E-02	1.8E-02
Tetrachloroethene	7.0E-01	7.0E-01
Thallium	6.2E+01	6.2E+01
Toluene	2.9E+00	2.9E+00
Toxaphene	4.2E-04	4.2E-04
TPH (gasolines)	8.3E+01	8.3E+01
TPH (middle distillates)	8.3E+01	8.3E+01
TPH (residual fuels)	5.0E+03	5.0E+03
1,2,4-Trichlorobenzene	1.5E+00	1.5E+00
1,1,1-Trichloroethane	7.8E+00	7.8E+00
1,1,2-Trichloroethane	7.0E-02	7.0E-02
Trichloroethene	4.6E-01	4.6E-01
2,4,5-Trichlorophenol	1.8E-01	1.8E-01
2,4,6-Trichlorophenol	2.3E-01	2.3E-01
Vanadium	7.7E+02	7.7E+02
Vinyl chloride	8.5E-02	8.5E-02
Xylenes	2.3E+00	2.3E+00
Zinc	2.5E+03	5.0E+03

Notes:

1. Shallow soils defined as soils less than or equal to 3 meters (approximately 10 feet) below ground surface.
 2. Category "Unrestricted Land Use" generally considered adequate for other sensitive uses.
 3. Assumes potential discharge of groundwater into a freshwater, marine or estuary surface water system.
- Soil standards intended to address direct-exposure, groundwater protection, ecologic (urban areas) and nuisance concerns under noted land-use scenarios. **Soil gas data should be collected for additional evaluation of potential indoor-air impacts at sites with areas of VOC-contaminated soil.**
- Groundwater intended to be address drinking water, surface water, indoor-air and nuisance concerns. **Use in conjunction with soil gas protection values to more closely evaluate potential impacts to indoor-air if groundwater screening levels for this concern approached or exceeded.**
- Aquatic habitat goals for bioaccumulation concerns not considered in selection of groundwater goals.
- TPH -Total Petroleum Hydrocarbons. TPH standards must be used in conjunction with the standard related chemicals (e.g., BTEX, PAHs, oxidizers, etc.).
- All water associated with the Snake River Plain Aquifer is considered to be a drinking water source.

**Table C. Tribal Cleanup Standards
Indoor Air and Soil Gas
(Vapor Intrusion Concerns)**

Chemical	Indoor Air Protection Values		² Shallow Soil Gas Protection Values	
	¹ Residential Land Use (µg/m ³)	Commercial/Industrial Land Use Only (µg/m ³)	¹ Residential Land Use (µg/m ³)	Commercial/Industrial Land Use Only (µg/m ³)
Acenaphthene	4.4E+01	6.1E+01	4.4E+04	1.2E+05
Acenaphthylene	2.2E+01	3.1E+01	2.2E+04	6.1E+04
Acetone	6.6E+02	9.2E+02	6.6E+05	1.8E+06
Aldrin				
Anthracene	2.2E+02	3.1E+02	2.2E+05	6.1E+05
Antimony				
Arsenic				
Barium				
Benzene	8.4E-02	1.4E-01	8.4E+01	2.8E+02
Benzo(a)anthracene				
Benzo(b)fluoranthene				
Benzo(k)fluoranthene				
Benzo(g,h,i)perylene				
Benzo(a)pyrene				
Beryllium				
1,1-Biphenyl				
Bis(2-chloroethyl) ether	7.4E-03	1.2E-02	7.4E+00	2.5E+01
Bis(2-chloroisopropyl) ether	3.4E-03	5.8E-03	3.4E+00	1.2E+01
Bis(2-ethylhexyl) phthalate				
Boron				
Bromodichloromethane	1.4E-01	2.3E-01	1.4E+02	4.6E+02
Bromoform (Tribromomethane)				
Bromomethane	1.0E+00	1.5E+00	1.0E+03	2.9E+03
Cadmium				
Carbon tetrachloride	1.9E-02	3.1E-02	1.9E+01	6.3E+01
Chlordane				
p-Chloroaniline				
Chlorobenzene	2.1E+02	2.9E+02	2.1E+05	5.8E+05
Chloroethane	2.1E+01	2.9E+01	2.1E+04	5.8E+04
Chloroform	4.6E-01	7.7E-01	4.6E+02	1.5E+03
Chloromethane	1.9E+01	2.6E+01	1.9E+04	5.3E+04
2-Chlorophenol	3.7E+00	5.1E+00	3.7E+03	1.0E+04
Chromium (total)				
Chromium III				
Chromium VI				
Chrysene				
Cobalt				
Copper				
Cyanide	1.5E+01	2.0E+01	1.5E+04	4.1E+04
Dibenz(a,h)anthracene				
Dibromochloromethane				
1,2-dibromo-3-chloropropane	1.3E-03	2.2E-03	1.3E+00	4.3E+00
1,2-Dibromoethane	4.1E-03	6.8E-03	4.1E+00	1.4E+01
1,2-Dichlorobenzene	4.2E+01	5.8E+01	4.2E+04	1.2E+05
1,3-Dichlorobenzene	2.2E+01	3.1E+01	2.2E+04	6.1E+04

**Table C. Tribal Cleanup Standards
Indoor Air and Soil Gas
(Vapor Intrusion Concerns)**

Chemical	Indoor Air Protection Values		² Shallow Soil Gas Protection Values	
	¹ Residential Land Use (µg/m ³)	Commercial/Industrial Land Use Only (µg/m ³)	¹ Residential Land Use (µg/m ³)	Commercial/Industrial Land Use Only (µg/m ³)
1,4-Dichlorobenzene	2.2E-01	3.7E-01	2.2E+02	7.4E+02
3,3-Dichlorobenzidine				
Dichlorodiphenyldichloroethane (DDD)				
Dichlorodiphenyldichloroethene (DDE)				
Dichlorodiphenyltrichloroethane (DDT)				
1,1-Dichloroethane	1.5E+00	2.6E+00	1.5E+03	5.1E+03
1,2-Dichloroethane	9.4E-02	1.6E-01	9.4E+01	3.1E+02
1,1-Dichloroethene	4.2E+01	5.8E+01	4.2E+04	1.2E+05
<i>cis</i> -1,2-Dichloroethene	7.3E+00	1.0E+01	7.3E+03	2.0E+04
<i>trans</i> -1,2-Dichloroethene	1.5E+01	2.0E+01	1.5E+04	4.1E+04
2,4-Dichlorophenol				
1,2-Dichloropropane	2.4E-01	4.1E-01	2.4E+02	8.2E+02
1,3-Dichloropropene	1.5E-01	2.6E-01	1.5E+02	5.1E+02
Dieldrin				
Diethyl phthalate				
Dimethyl phthalate				
2,4-Dimethylphenol				
2,4-Dinitrophenol				
2,4-Dinitrotoluene				
1,4-Dioxane				
Dioxin (2,3,7,8-TCDD)				
Endosulfan				
Endrin				
Ethylbenzene	9.8E-01	1.6E+00	9.8E+02	3.3E+03
Fluoranthene				
Fluorene	2.9E+01	4.1E+01	2.9E+04	8.2E+04
Heptachlor				
Heptachlor epoxide				
Hexachlorobenzene				
Hexachlorobutadiene				
γ-Hexachlorocyclohexane (Lindane)				
Hexachloroethane				
Indeno(1,2,3-c,d)pyrene				
Lead				
Mercury (elemental)	1.9E-02	2.6E-02	1.9E+01	5.3E+01
Methoxychlor				
Methylene chloride	5.2E+00	8.7E+00	5.2E+03	1.7E+04
Methyl ethyl ketone	1.0E+03	1.5E+03	1.0E+06	2.9E+06
Methyl isobutyl ketone	6.3E+02	8.8E+02	6.3E+05	1.8E+06
Methyl mercury				
2-Methylnaphthalene				
<i>tert</i> -Butyl methyl ether	9.4E+00	1.6E+01	9.4E+03	3.1E+04
Molybdenum				
Naphthalene	7.2E-02	1.2E-01	7.2E+01	2.4E+02

**Table C. Tribal Cleanup Standards
Indoor Air and Soil Gas
(Vapor Intrusion Concerns)**

Chemical	Indoor Air Protection Values		² Shallow Soil Gas Protection Values	
	¹ Residential Land Use (µg/m ³)	Commercial/Industrial Land Use Only (µg/m ³)	¹ Residential Land Use (µg/m ³)	Commercial/Industrial Land Use Only (µg/m ³)
Nickel				
Pentachlorophenol				
Perchlorate				
Phenanthrene	2.2E+01	3.1E+01	2.2E+04	6.1E+04
Phenol				
Polychlorinated biphenyls (PCBs)				
Pyrene	2.2E+01	3.1E+01	2.2E+04	6.1E+04
Selenium				
Silver				
Styrene	1.9E+02	2.6E+02	1.9E+05	5.3E+05
<i>tert</i> -Butyl alcohol				
1,1,1,2-Tetrachloroethane	3.2E-01	5.4E-01	3.2E+02	1.1E+03
1,1,2,2-Tetrachloroethane	4.2E-02	7.0E-02	4.2E+01	1.4E+02
Tetrachloroethene	4.1E-01	6.9E-01	4.1E+02	1.4E+03
Thallium				
Toluene	6.3E+01	8.8E+01	6.3E+04	1.8E+05
Toxaphene				
TPH (gasolines)	1.0E+01	1.4E+01	1.0E+04	2.9E+04
TPH (middle distillates)	1.0E+01	1.4E+01	1.0E+04	2.9E+04
TPH (residual fuels)				
1,2,4-Trichlorobenzene	8.3E-01	1.2E+00	8.3E+02	2.3E+03
1,1,1-Trichloroethane	4.6E+02	6.4E+02	4.6E+05	1.3E+06
1,1,2-Trichloroethane	1.5E-01	2.6E-01	1.5E+02	5.1E+02
Trichloroethene	1.2E+00	2.0E+00	1.2E+03	4.1E+03
2,4,5-Trichlorophenol	7.3E+01	1.0E+02	7.3E+04	2.0E+05
2,4,6-Trichlorophenol				
Vanadium				
Vinyl chloride	3.1E-02	5.2E-02	3.1E+01	1.0E+02
Xylenes	2.1E+01	2.9E+01	2.1E+04	5.8E+04
Zinc				

Notes:

- Category "Unrestricted Land Use" generally considered adequate for other sensitive uses (e.g., day-care centers, hospitals, etc.)
- Soil Gas: protection values based on soil gas data collected below a building or the ground surface. Intended for evaluation of potential indoor-air impacts.

Soil gas data should be collected and evaluated at all sites with significant areas of VOC-contaminated soil. Screening levels also apply to areas over of contaminated groundwater.

TPH -Total Petroleum Hydrocarbons. TPH standards must be used in conjunction with standards for related chemicals (e.g., BTEX, PAHs, oxidizers, etc.).

**Table D. Tribal Cleanup Standards
Surface Water Bodies**

Chemical	Surface Water Protection Values
	Freshwater (µg/L)
Acenaphthene	2.0E+01
Acenaphthylene	3.0E+01
Acetone	1.5E+03
Aldrin	1.4E-04
Anthracene	7.3E-01
Antimony	6.0E+00
Arsenic	1.4E-01
Barium	1.0E+03
Benzene	1.0E+00
Benzo(a)anthracene	2.7E-02
Benzo(b)fluoranthene	2.9E-02
Benzo(k)fluoranthene	2.9E-02
Benzo(g,h,i)perylene	1.0E-01
Benzo(a)pyrene	1.4E-02
Beryllium	2.7E+00
1,1-Biphenyl	5.0E-01
Bis(2-chloroethyl) ether	3.2E-02
Bis(2-chloroisopropyl) ether	1.4E-02
Bis(2-ethylhexyl) phthalate	4.0E+00
Boron	1.6E+00
Bromodichloromethane	1.0E+02
Bromoform (Tribromomethane)	1.0E+02
Bromomethane	9.8E+00
Cadmium	2.5E-01
Carbon tetrachloride	5.0E-01
Chlordane	5.9E-04
p-Chloroaniline	5.0E+00
Chlorobenzene	2.5E+01
Chloroethane	1.2E+01
Chloroform	7.0E+01
Chloromethane	1.8E+02
2-Chlorophenol	1.8E-01
Chromium (total)	5.0E+01
Chromium III	1.8E+02
Chromium VI	1.1E+01
Chrysene	4.9E-02
Cobalt	3.0E+00
Copper	9.0E+00
Cyanide	5.2E+00
Dibenz(a,h)anthracene	4.8E-03
Dibromochloromethane	4.6E+01
1,2-dibromo-3-chloropropane	2.0E-01
1,2-Dibromoethane	5.0E-02
1,2-Dichlorobenzene	1.0E+01
1,3-Dichlorobenzene	7.1E+01
1,4-Dichlorobenzene	5.0E+00
3,3-Dichlorobenzidine	2.9E-02
Dichlorodiphenyldichloroethane (DDD)	8.4E-04

**Table D. Tribal Cleanup Standards
Surface Water Bodies**

Chemical	Surface Water Protection Values
	Freshwater (µg/L)
Dichlorodiphenyldichloroethene (DDE)	5.9E-04
Dichlorodiphenyltrichloroethane (DDT)	5.9E-04
1,1-Dichloroethane	5.0E+00
1,2-Dichloroethane	5.0E-01
1,1-Dichloroethene	3.2E+00
<i>cis</i> -1,2-Dichloroethene	6.0E+00
<i>trans</i> -1,2-Dichloroethene	1.0E+01
2,4-Dichlorophenol	3.0E-01
1,2-Dichloropropane	5.0E+00
1,3-Dichloropropene	5.0E-01
Dieldrin	1.4E-04
Diethyl phthalate	1.5E+00
Dimethyl phthalate	1.5E+00
2,4-Dimethylphenol	1.0E+02
2,4-Dinitrophenol	7.5E+01
2,4-Dinitrotoluene	5.1E-02
1,4-Dioxane	3.0E+00
Dioxin (2,3,7,8-TCDD)	1.4E-08
Endosulfan	5.6E-02
Endrin	3.6E-02
Ethylbenzene	3.0E+01
Fluoranthene	8.1E+00
Fluorene	3.9E+00
Heptachlor	2.1E-04
Heptachlor epoxide	1.1E-04
Hexachlorobenzene	7.7E-04
Hexachlorobutadiene	4.5E-01
γ -Hexachlorocyclohexane (Lindane)	6.3E-02
Hexachloroethane	9.0E-01
Indeno(1,2,3-c,d)pyrene	4.8E-02
Lead	2.5E+00
Mercury (elemental)	2.5E-02
Methoxychlor	1.9E-02
Methylene chloride	5.0E+00
Methyl ethyl ketone	4.2E+03
Methyl isobutyl ketone	1.2E+02
Methyl mercury	3.0E-03
2-Methylnaphthalene	2.1E+00
<i>tert</i> -Butyl methyl ether	5.0E+00
Molybdenum	3.5E+01
Naphthalene	1.7E+01
Nickel	5.2E+01
Pentachlorophenol	1.0E+00
Perchlorate	6.0E+00
Phenanthrene	6.3E+00
Phenol	5.0E+00
Polychlorinated biphenyls (PCBs)	1.7E-04
Pyrene	2.0E+00

**Table D. Tribal Cleanup Standards
Surface Water Bodies**

Chemical	Surface Water Protection Values
	Freshwater (µg/L)
Selenium	5.0E+00
Silver	3.4E-01
Styrene	1.0E+01
<i>tert</i> -Butyl alcohol	1.2E+01
1,1,1,2-Tetrachloroethane	1.3E+00
1,1,2,2-Tetrachloroethane	1.0E+00
Tetrachloroethene	5.0E+00
Thallium	2.0E+00
Toluene	4.0E+01
Toxaphene	2.0E-04
TPH (gasolines)	1.0E+02
TPH (middle distillates)	1.0E+02
TPH (residual fuels)	1.0E+02
1,2,4-Trichlorobenzene	5.0E+00
1,1,1-Trichloroethane	6.2E+01
1,1,2-Trichloroethane	5.0E+00
Trichloroethene	5.0E+00
2,4,5-Trichlorophenol	6.3E+01
2,4,6-Trichlorophenol	7.0E-01
Vanadium	1.5E+01
Vinyl chloride	5.0E-01
Xylenes	2.0E+01
Zinc	1.2E+02
Notes:	
<p>Surface water protection values lowest of drinking water goal, chronic aquatic habitat goal, goal to address bioaccumulation in aquatic organisms and subsequent consumption by humans, and general nuisance goal (odors, etc.).</p> <p>Water for ethanol based on gross contamination concerns</p> <p>TPH -Total Petroleum Hydrocarbons. TPH standards must be used in conjunction with standards for related chemicals (e.g., BTEX, PAHs, oxidizers, etc.).</p> <p>All water associated with the Snake River Plain Aquifer is considered to be a drinking water source.</p>	

**Lookup Table A-1. ¹Shallow Soil Cleanup Standard Values (<3m bgs)
²Unrestricted Land Use**

² Unrestricted Land Use (mg/kg)						
Chemical	Final Cleanup Level	Gross Contamination Ceiling Value (Odors, etc.)	Urban Area Ecotoxicity Criteria	Human Health		Groundwater Protection (Soil Leaching)
		Table F-2		Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
		Table A-1		Table A-1	Table E	
Acenaphthene	1.6E+01	1.0E+03	-		5.0E+02	(Use soil gas)
Acenaphthylene	1.3E+01	5.0E+02	-		3.4E+02	(Use soil gas)
Acetone	5.0E-01	5.0E+02	-		2.8E+03	(Use soil gas)
Aldrin	3.2E-02	1.0E+03	3.5E-01		3.2E-02	
Anthracene	2.8E+00	5.0E+02	4.0E+01		3.1E+03	(Use soil gas)
Antimony	6.3E+00	1.0E+03	2.0E+01		6.3E+00	
Arsenic	3.9E-01	1.0E+03	2.0E+01		3.9E-01	
Barium	7.5E+02	1.0E+03	7.5E+02		3.0E+03	
Benzene	4.4E-02	5.0E+02	2.5E+01		1.2E-01	(Use soil gas)
Benzo(a)anthracene	3.8E-01	5.0E+02	4.0E+01		3.8E-01	
Benzo(b)fluoranthene	3.8E-01	5.0E+02	4.0E+01		3.8E-01	
Benzo(k)fluoranthene	3.8E-01	5.0E+02	-		3.8E-01	
Benzo(g,h,i)perylene	2.7E+01	5.0E+02	4.0E+01		3.4E+02	
Benzo(a)pyrene	3.8E-02	5.0E+02	4.0E+01		3.8E-02	
Beryllium	4.0E+00	1.0E+03	4.0E+00		3.1E+01	
1,1-Biphenyl	6.5E-01	5.0E+02	-		6.1E+02	(Use soil gas)
Bis(2-chloroethyl) ether	4.0E-04	5.0E+02	-		1.5E-01	(Use soil gas)
Bis(2-chloroisopropyl) ether	1.5E-04	5.0E+02	-		3.4E-02	(Use soil gas)
Bis(2-ethylhexyl) phthalate	3.5E+01	5.0E+02	-		3.5E+01	
Boron	1.6E+00	no criteria	1.6E+00		3.1E+03	
Bromodichloromethane	5.7E-01	1.0E+03	-		5.7E-01	(Use soil gas)
Bromoform (Tribromomethane)	2.2E+00	5.0E+02	-		8.1E+01	
Bromomethane	3.9E-01	5.0E+02	-		7.0E-01	(Use soil gas)
Cadmium	1.7E+00	1.0E+03	1.2E+01		1.7E+00	

Lookup Table A-1. ¹Shallow Soil Cleanup Standard Values (<3m bgs)
²Unrestricted Land Use

² Unrestricted Land Use (mg/kg)						
Chemical	Final Cleanup Level	Gross Contamination Ceiling Value (Odors, etc.)	Urban Area Ecotoxicity Criteria	Human Health		Groundwater Protection (Soil Leaching)
		Table F-2		Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
		Table A-1		Table A-1	Table E	
Carbon tetrachloride	2.0E-02	5.0E+02	-		2.0E-02	(Use soil gas)
Chlordane	4.4E-01	1.0E+03	-		4.4E-01	
p-Chloroaniline	5.3E-02	1.0E+03	-		6.3E+01	
Chlorobenzene	1.5E+00	5.0E+02	3.0E+01		1.6E+02	(Use soil gas)
Chloroethane	8.5E-01	5.0E+02	-		1.0E+01	(Use soil gas)
Chloroform	6.8E-01	5.0E+02	-		6.8E-01	(Use soil gas)
Chloromethane	6.4E+00	1.0E+02	-		7.7E+00	(Use soil gas)
2-Chlorophenol	1.2E-02	1.0E+02	1.0E+01		7.6E+00	(Use soil gas)
Chromium (total)	0.0E+00	1.0E+03	0.0E+00		-	
Chromium III	7.5E+02	1.0E+03	7.5E+02		2.3E+04	
Chromium VI	8.0E+00	1.0E+03	8.0E+00		9.4E+00	
Chrysene	2.3E+01	1.0E+03	4.0E+01		6.2E+01	
Cobalt	4.0E+01	1.0E+03	4.0E+01		2.8E+02	
Copper	2.3E+02	1.0E+03	2.3E+02		6.3E+03	
Cyanide	3.6E-03	1.0E+02	-		3.4E+01	
Dibenz(a,h)anthracene	6.2E-02	5.0E+02	-		6.2E-02	
Dibromochloromethane	7.6E+00	1.0E+02	-		7.6E+00	(Use soil gas)
1,2-dibromo-3-chloropropane	4.5E-03	5.0E+02	-		9.1E-02	(Use soil gas)
1,2-Dibromoethane	3.3E-04	5.0E+02	-		1.9E-02	(Use soil gas)
1,2-Dichlorobenzene	1.1E+00	6.0E+02	3.0E+01		1.3E+02	(Use soil gas)
1,3-Dichlorobenzene	7.4E+00	1.0E+02	3.0E+01		6.5E+01	(Use soil gas)
1,4-Dichlorobenzene	5.9E-01	5.0E+02	3.0E+01		1.2E+00	(Use soil gas)
3,3-Dichlorobenzidine	7.7E-03	5.0E+02	-		5.3E-01	
Dichlorodiphenyldichloroethane (DDD)	2.4E+00	5.0E+02	-		2.4E+00	

Lookup Table A-1. ¹Shallow Soil Cleanup Standard Values (<3m bgs)
²Unrestricted Land Use

² Unrestricted Land Use (mg/kg)						
Chemical	Final Cleanup Level	Gross Contamination Ceiling Value (Odors, etc.)	Urban Area Ecotoxicity Criteria	Human Health		Groundwater Protection (Soil Leaching)
		Table F-2		Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
		Table A-1		Table A-1	Table E	
Dichlorodiphenyldichloroethene (DDE)	1.7E+00	5.0E+02	4.0E+00		1.7E+00	
Dichlorodiphenyltrichloroethane (DDT)	1.7E+00	1.0E+03	4.0E+00		1.7E+00	
1,1-Dichloroethane	2.0E-01	5.0E+02	-		2.2E+00	(Use soil gas)
1,2-Dichloroethane	4.5E-03	5.0E+02	6.0E+01		2.2E-01	(Use soil gas)
1,1-Dichloroethene	1.0E+00	5.0E+02	-		1.9E+01	(Use soil gas)
<i>cis</i> -1,2-Dichloroethene	1.9E-01	1.0E+02	-		6.5E+00	(Use soil gas)
<i>trans</i> -1,2-Dichloroethene	6.7E-01	5.0E+02	-		1.0E+01	(Use soil gas)
2,4-Dichlorophenol	3.0E-01	5.0E+02	1.0E+01		4.7E+01	
1,2-Dichloropropane	1.2E-01	1.0E+02	-		4.6E-01	(Use soil gas)
1,3-Dichloropropene	5.9E-02	5.0E+02	-		1.7E-01	(Use soil gas)
Dieldrin	2.3E-03	1.0E+03	4.0E+00		3.4E-02	
Diethyl phthalate	3.5E-02	5.0E+02	-		9.8E+03	
Dimethyl phthalate	3.5E-02	5.0E+02	-		1.2E+05	
2,4-Dimethylphenol	6.7E-01	1.0E+02	-		3.1E+02	(Use soil gas)
2,4-Dinitrophenol	4.2E-02	5.0E+02	-		3.1E+02	
2,4-Dinitrotoluene	3.9E-04	5.0E+02	-		9.4E-01	
1,4-Dioxane	1.8E-03	5.0E+02	-		2.4E+01	
Dioxin (2,3,7,8-TCDD)	4.5E-06	no criteria	-		4.5E-06	
Endosulfan	4.6E-03	5.0E+02	-		8.2E+01	
Endrin	6.5E-04	5.0E+02	6.0E-02		4.1E+00	
Ethylbenzene	2.3E+00	4.0E+02	-		2.3E+00	(Use soil gas)
Fluoranthene	4.0E+01	5.0E+02	4.0E+01		4.6E+02	
Fluorene	8.9E+00	5.0E+02	-		3.9E+02	(Use soil gas)
Heptachlor	1.3E-02	1.0E+03	-		1.2E-01	

Lookup Table A-1. ¹Shallow Soil Cleanup Standard Values (<3m bgs)
²Unrestricted Land Use

Chemical	Final Cleanup Level	Gross Contamination Ceiling Value (Odors, etc.) Table F-2	Urban Area Ecotoxicity Criteria	² Unrestricted Land Use (mg/kg)		
				Human Health		Groundwater Protection (Soil Leaching)
				Direct Exposure Table A-1	Vapor Intrusion Into Buildings	Drinking Water Resource Table E
Heptachlor epoxide	1.4E-02	1.0E+03	-		6.1E-02	
Hexachlorobenzene	3.4E-01	5.0E+02	3.0E+01		3.4E-01	
Hexachlorobutadiene	2.2E+00	5.0E+02	-		3.1E+00	
γ-Hexachlorocyclohexane (Lindane)	9.8E-03	5.0E+02	2.0E+00		4.1E+00	
Hexachloroethane	3.0E+00	5.0E+02	-		1.2E+01	
Indeno(1,2,3-c,d)pyrene	6.2E-01	5.0E+02	4.0E+01		6.2E-01	
Lead	2.0E+02	1.0E+03	2.0E+02		2.6E+02	
Mercury (elemental)	1.3E+00	5.0E+02	1.0E+01		1.3E+00	(Use soil gas)
Methoxychlor	1.9E+01	5.0E+02	-		-	
Methylene chloride	7.7E-02	5.0E+02	-		7.2E+00	(Use soil gas)
Methyl ethyl ketone	3.9E+00	5.0E+02	-		4.3E+03	(Use soil gas)
Methyl isobutyl ketone	2.8E+00	1.0E+02	1.0E+01		3.1E+03	(Use soil gas)
Methyl mercury	1.2E+00	1.0E+02	-		1.2E+00	
2-Methylnaphthalene	2.5E-01	5.0E+02	-		4.6E+01	(Use soil gas)
tert-Butyl methyl ether	2.3E-02	1.0E+02	-		3.0E+01	(Use soil gas)
Molybdenum	4.0E+01	1.0E+03	4.0E+01		7.8E+01	
Naphthalene	1.3E+00	5.0E+02	4.0E+01		1.3E+00	(Use soil gas)
Nickel	1.5E+02	1.0E+03	1.5E+02		3.0E+02	
Pentachlorophenol	3.0E+00	5.0E+02	5.0E+00		3.0E+00	
Perchlorate	1.1E+01	1.0E+03	-		1.1E+01	
Phenanthrene	1.1E+01	5.0E+02	4.0E+01		3.4E+02	(Use soil gas)
Phenol	7.6E-02	5.0E+02	4.0E+01		4.7E+03	
Polychlorinated biphenyls (PCBs)	2.2E-01	5.0E+02	-		2.2E-01	
Pyrene	8.5E+01	5.0E+02	-		6.9E+02	(Use soil gas)

Lookup Table A-1. ¹Shallow Soil Cleanup Standard Values (<3m bgs)
²Unrestricted Land Use

² Unrestricted Land Use (mg/kg)						
Chemical	Final Cleanup Level	Gross Contamination Ceiling Value (Odors, etc.)	Urban Area Ecotoxicity Criteria	Human Health		Groundwater Protection (Soil Leaching)
		Table F-2		Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
		Table A-1		Table A-1	Table E	
Selenium	1.0E+01	1.0E+03	1.0E+01		7.8E+01	
Silver	2.0E+01	1.0E+03	2.0E+01		7.8E+01	
Styrene	1.5E+00	5.0E+02	-		5.0E+02	(Use soil gas)
<i>tert</i> -Butyl alcohol	7.5E-02	1.0E+02	-		3.2E+05	(Use soil gas)
1,1,1,2-Tetrachloroethane	2.4E-02	1.0E+02	-		2.0E+00	(Use soil gas)
1,1,2,2-Tetrachloroethane	1.8E-02	5.0E+02	-		2.7E-01	(Use soil gas)
Tetrachloroethene	3.7E-01	2.3E+02	-		3.7E-01	(Use soil gas)
Thallium	1.3E+00	1.0E+03	-		1.3E+00	
Toluene	2.9E+00	5.0E+02	-		6.3E+01	(Use soil gas)
Toxaphene	4.2E-04	5.0E+02	-		4.6E-01	
TPH (gasolines)	8.3E+01	1.0E+02	-		1.1E+02	(Use soil gas)
TPH (middle distillates)	8.3E+01	1.0E+02	-		1.1E+02	(Use soil gas)
TPH (residual fuels)	3.7E+02	5.0E+02	-		3.7E+02	
1,2,4-Trichlorobenzene	1.5E+00	5.0E+02	3.0E+01		7.9E+00	(Use soil gas)
1,1,1-Trichloroethane	7.8E+00	5.0E+02	-		2.8E+02	(Use soil gas)
1,1,2-Trichloroethane	7.0E-02	1.0E+02	-		5.0E-01	(Use soil gas)
Trichloroethene	4.6E-01	5.0E+02	6.0E+01		1.9E+00	(Use soil gas)
2,4,5-Trichlorophenol	1.8E-01	1.0E+02	1.0E+01		4.0E+02	(Use soil gas)
2,4,6-Trichlorophenol	2.3E-01	5.0E+02	1.0E+01		1.6E+00	
Vanadium	1.6E+01	1.0E+03	2.0E+02		1.6E+01	
Vinyl chloride	2.2E-02	5.0E+02	6.0E+01		2.2E-02	(Use soil gas)
Xylenes	2.3E+00	4.2E+02	-		3.1E+01	(Use soil gas)
Zinc	6.0E+02	1.0E+03	6.0E+02		4.7E+03	

**Lookup Table A-1. ¹Shallow Soil Cleanup Standard Values (<3m bgs)
²Unrestricted Land Use**

² Unrestricted Land Use (mg/kg)						
Chemical	Final Cleanup Level	Gross Contamination Ceiling Value (Odors, etc.)	Urban Area Ecotoxicity Criteria	Human Health		Groundwater Protection (Soil Leaching)
		Table F-2		Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
				Table A-1		Table E
Electrical Conductivity (mS/cm, USEPA Method 120.1 MOD)	0.0E+00	-	-	-	-	-
Sodium Adsorption Ratio	0.0E+00	-	-	-	-	-

Notes:

- Shallow soils defined as soils <3 meters below ground surface.**
- Unrestricted Land Use protection values generally considered adequate for other sensitive uses.**

Final Level is lowest of ceiling value (nuisance concerns etc.), ecotoxicity, direct-exposure, indoor-air impact, and leaching cleanup standard values.

Soil data should be reported on dry-weight basis (see Section 6.2).

TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.

All water associated with the Snake River Plain Aquifer is considered to be a drinking water source.

**Lookup Table A-2. ¹Shallow Soil Cleanup Standard Values (<3m bgs)
Commercial/Industrial Land Use**

Commercial/Industrial Land Use (mg/kg)						
Chemical	Final Cleanup Level	Gross Contamination Ceiling Value (Odors, etc.)	Urban Area Ecotoxicity Criteria	Human Health		Groundwater Protection (Soil Leaching)
				Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
		Table F-3		Table I-2	Table E	
Acenaphthene	1.6E+01	2.5E+03	-	3.1E+03	(Use soil gas)	1.6E+01
Acenaphthylene	1.3E+01	1.0E+03	-	3.3E+03	(Use soil gas)	1.3E+01
Acetone	5.0E-01	1.0E+03	-	1.1E+04	(Use soil gas)	5.0E-01
Aldrin	1.3E-01	2.5E+03	3.5E-01	1.3E-01		5.0E+00
Anthracene	2.8E+00	1.0E+03	4.0E+01	2.6E+04	(Use soil gas)	2.8E+00
Antimony	4.0E+01	2.5E+03	4.0E+01	8.2E+01		
Arsenic	1.6E+00	2.5E+03	4.0E+01	1.6E+00		
Barium	1.5E+03	2.5E+03	1.5E+03	3.4E+04		
Benzene	4.4E-02	8.7E+02	2.5E+01	2.7E-01	(Use soil gas)	4.4E-02
Benzo(a)anthracene	1.3E+00	1.0E+03	4.0E+01	1.3E+00		1.2E+01
Benzo(b)fluoranthene	1.3E+00	1.0E+03	4.0E+01	1.3E+00		4.6E+01
Benzo(k)fluoranthene	1.3E+00	1.0E+03	-	1.3E+00		2.7E+00
Benzo(g,h,i)perylene	2.7E+01	1.0E+03	4.0E+01	3.3E+03		2.7E+01
Benzo(a)pyrene	1.3E-01	1.0E+03	4.0E+01	1.3E-01		1.3E+02
Beryllium	8.0E+00	2.5E+03	8.0E+00	3.9E+02		
1,1-Biphenyl	6.5E-01	1.0E+03	-	6.2E+03	(Use soil gas)	6.5E-01
Bis(2-chloroethyl) ether	4.0E-04	1.0E+03	-	3.8E-01	(Use soil gas)	4.0E-04
Bis(2-chloroisopropyl) ether	1.5E-04	7.9E+02	-	7.7E-02	(Use soil gas)	1.5E-04
Bis(2-ethylhexyl) phthalate	1.2E+02	1.0E+03	-	1.2E+02		7.8E+02
Boron	2.0E+00	no critiera	2.0E+00	4.1E+04		
Bromodichloromethane	1.3E+00	2.5E+03	-	1.3E+00	(Use soil gas)	1.9E+00
Bromoform (Tribromomethane)	2.2E+00	1.0E+03	-	3.6E+02		2.2E+00
Bromomethane	3.9E-01	1.0E+03	-	2.3E+00	(Use soil gas)	3.9E-01

**Lookup Table A-2. ¹Shallow Soil Cleanup Standard Values (<3m bgs)
Commercial/Industrial Land Use**

Commercial/Industrial Land Use (mg/kg)						
Chemical	Final Cleanup Level	Gross Contamination Ceiling Value (Odors, etc.)	Urban Area Ecotoxicity Criteria	Human Health		Groundwater Protection (Soil Leaching)
				Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
		Table F-3		Table I-2	Table E	
Cadmium	7.4E+00	2.5E+03	1.2E+01	7.4E+00		
Carbon tetrachloride	4.4E-02	1.0E+03	-	4.4E-02	(Use soil gas)	1.1E-01
Chlordane	1.7E+00	2.5E+03	-	1.7E+00		1.5E+01
p-Chloroaniline	5.3E-02	2.5E+03	-	8.2E+02		5.3E-02
Chlorobenzene	1.5E+00	6.8E+02	3.0E+01	6.8E+02	(Use soil gas)	1.5E+00
Chloroethane	8.5E-01	1.0E+03	-	3.4E+01	(Use soil gas)	8.5E-01
Chloroform	1.5E+00	1.0E+03	-	1.5E+00	(Use soil gas)	2.1E+00
Chloromethane	6.4E+00	5.0E+02	-	2.5E+01	(Use soil gas)	6.4E+00
2-Chlorophenol	1.2E-02	5.0E+02	1.0E+01	2.7E+01	(Use soil gas)	1.2E-02
Chromium (total)	0.0E+00	2.5E+03	0.0E+00	-		
Chromium III	7.5E+02	2.5E+03	7.5E+02	3.1E+05		
Chromium VI	8.0E+00	2.5E+03	8.0E+00	3.6E+01		
Chrysene	2.3E+01	2.5E+03	4.0E+01	2.1E+02		2.3E+01
Cobalt	8.0E+01	2.5E+03	8.0E+01	1.9E+03		
Copper	2.3E+02	2.5E+03	2.3E+02	8.2E+04		
Cyanide	3.6E-03	5.0E+02	-	1.2E+02		3.6E-03
Dibenz(a,h)anthracene	2.1E-01	1.0E+03	-	2.1E-01		9.9E+00
Dibromochloromethane	8.3E+00	5.0E+02	-	3.4E+01	(Use soil gas)	8.3E+00
1,2-dibromo-3-chloropropane	4.5E-03	1.0E+03	-	4.1E-01	(Use soil gas)	4.5E-03
1,2-Dibromoethane	3.3E-04	1.0E+03	-	4.4E-02	(Use soil gas)	3.3E-04
1,2-Dichlorobenzene	1.1E+00	6.0E+02	3.0E+01	4.6E+02	(Use soil gas)	1.1E+00
1,3-Dichlorobenzene	7.4E+00	6.0E+02	3.0E+01	2.4E+02	(Use soil gas)	7.4E+00
1,4-Dichlorobenzene	5.9E-01	1.0E+03	3.0E+01	2.6E+00	(Use soil gas)	5.9E-01

**Lookup Table A-2. ¹Shallow Soil Cleanup Standard Values (<3m bgs)
Commercial/Industrial Land Use**

Commercial/Industrial Land Use (mg/kg)						
Chemical	Final Cleanup Level	Gross Contamination Ceiling Value (Odors, etc.)	Urban Area Ecotoxicity Criteria	Human Health		Groundwater Protection (Soil Leaching)
				Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
		Table F-3		Table I-2	Table E	
3,3-Dichlorobenzidine	7.7E-03	1.0E+03	-	2.4E+00		7.7E-03
Dichlorodiphenyldichloroethane (DDD)	1.0E+01	1.0E+03	-	1.0E+01		7.5E+02
Dichlorodiphenyldichloroethene (DDE)	4.0E+00	1.0E+03	4.0E+00	7.0E+00		1.1E+03
Dichlorodiphenyltrichloroethane (DDT)	4.0E+00	2.5E+03	4.0E+00	7.0E+00		4.3E+00
1,1-Dichloroethane	2.0E-01	1.0E+03	-	4.7E+00	(Use soil gas)	2.0E-01
1,2-Dichloroethane	4.5E-03	1.0E+03	6.0E+01	4.8E-01	(Use soil gas)	4.5E-03
1,1-Dichloroethene	1.0E+00	1.0E+03	-	6.5E+01	(Use soil gas)	1.0E+00
<i>cis</i> -1,2-Dichloroethene	1.9E-01	5.0E+02	-	2.2E+01	(Use soil gas)	1.9E-01
<i>trans</i> -1,2-Dichloroethene	6.7E-01	1.0E+03	-	3.4E+01	(Use soil gas)	6.7E-01
2,4-Dichlorophenol	3.0E-01	1.0E+03	1.0E+01	6.1E+02		3.0E-01
1,2-Dichloropropane	1.2E-01	5.0E+02	-	1.0E+00	(Use soil gas)	1.2E-01
1,3-Dichloropropene	5.9E-02	1.0E+03	-	3.6E-01	(Use soil gas)	5.9E-02
Dieldrin	2.3E-03	2.5E+03	4.0E+00	1.3E-01		2.3E-03
Diethyl phthalate	3.5E-02	1.0E+03	-	9.8E+04		3.5E-02
Dimethyl phthalate	3.5E-02	1.0E+03	-	1.2E+06		3.5E-02
2,4-Dimethylphenol	6.7E-01	5.0E+02	-	4.1E+03	(Use soil gas)	6.7E-01
2,4-Dinitrophenol	4.2E-02	1.0E+03	-	4.1E+03		4.2E-02
2,4-Dinitrotoluene	3.9E-04	1.0E+03	-	4.2E+00		3.9E-04
1,4-Dioxane	1.8E-03	1.0E+03	-	1.1E+02		1.8E-03
Dioxin (2,3,7,8-TCDD)	1.8E-05	no criteria	-	1.8E-05		
Endosulfan	4.6E-03	1.0E+03	-	9.2E+02		4.6E-03
Endrin	6.5E-04	1.0E+03	6.0E-02	4.6E+01		6.5E-04
Ethylbenzene	3.3E+00	4.0E+02	-	5.0E+00	(Use soil gas)	3.3E+00

**Lookup Table A-2. ¹Shallow Soil Cleanup Standard Values (<3m bgs)
Commercial/Industrial Land Use**

Commercial/Industrial Land Use (mg/kg)						
Chemical	Final Cleanup Level	Gross Contamination Ceiling Value (Odors, etc.)	Urban Area Ecotoxicity Criteria	Human Health		Groundwater Protection (Soil Leaching)
				Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
		Table F-3		Table I-2	Table E	
Fluoranthene	4.0E+01	1.0E+03	4.0E+01	4.4E+03		6.0E+01
Fluorene	8.9E+00	1.0E+03	-	2.8E+03	(Use soil gas)	8.9E+00
Heptachlor	1.3E-02	2.5E+03	-	4.8E-01		1.3E-02
Heptachlor epoxide	1.4E-02	2.5E+03	-	2.4E-01		1.4E-02
Hexachlorobenzene	1.3E+00	1.0E+03	3.0E+01	1.3E+00		7.9E+02
Hexachlorobutadiene	2.2E+00	1.0E+03	-	3.7E+01		2.2E+00
γ -Hexachlorocyclohexane (Lindane)	9.8E-03	1.0E+03	2.0E+00	4.6E+01		9.8E-03
Hexachloroethane	3.0E+00	1.0E+03	-	4.4E+01		3.0E+00
Indeno(1,2,3-c,d)pyrene	2.1E+00	1.0E+03	4.0E+01	2.1E+00		1.3E+01
Lead	7.5E+02	2.5E+03	-	7.5E+02		
Mercury (elemental)	1.0E+01	1.0E+03	1.0E+01	1.8E+01	(Use soil gas)	
Methoxychlor	1.9E+01	1.0E+03	-	-		1.9E+01
Methylene chloride	7.7E-02	1.0E+03	-	1.7E+01	(Use soil gas)	7.7E-02
Methyl ethyl ketone	3.9E+00	1.0E+03	-	2.1E+04	(Use soil gas)	3.9E+00
Methyl isobutyl ketone	2.8E+00	5.0E+02	1.0E+01	1.2E+04	(Use soil gas)	2.8E+00
Methyl mercury	1.2E+01	5.0E+02	-	1.2E+01		
2-Methylnaphthalene	2.5E-01	1.0E+03	-	4.4E+02	(Use soil gas)	2.5E-01
<i>tert</i> -Butyl methyl ether	2.3E-02	5.0E+02	-	6.5E+01	(Use soil gas)	2.3E-02
Molybdenum	4.0E+01	2.5E+03	4.0E+01	1.0E+03		
Naphthalene	2.8E+00	1.0E+03	4.0E+01	2.8E+00	(Use soil gas)	3.4E+00
Nickel	1.5E+02	2.5E+03	1.5E+02	3.4E+03		
Pentachlorophenol	5.0E+00	1.0E+03	5.0E+00	9.0E+00		2.7E+06
Perchlorate	1.4E+02	2.5E+03	-	1.4E+02		

**Lookup Table A-2. ¹Shallow Soil Cleanup Standard Values (<3m bgs)
Commercial/Industrial Land Use**

Commercial/Industrial Land Use (mg/kg)						
Chemical	Final Cleanup Level	Gross Contamination Ceiling Value (Odors, etc.)	Urban Area Ecotoxicity Criteria	Human Health		Groundwater Protection (Soil Leaching)
				Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
		Table F-3		Table I-2	Table E	
Phenanthrene	1.1E+01	1.0E+03	4.0E+01	3.3E+03	(Use soil gas)	1.1E+01
Phenol	7.6E-02	1.0E+03	4.0E+01	6.1E+04		7.6E-02
Polychlorinated biphenyls (PCBs)	7.4E-01	1.0E+03	-	7.4E-01		6.3E+00
Pyrene	8.5E+01	1.0E+03	-	6.6E+03	(Use soil gas)	8.5E+01
Selenium	1.0E+01	2.5E+03	1.0E+01	1.0E+03		
Silver	4.0E+01	2.5E+03	4.0E+01	1.0E+03		
Styrene	1.5E+00	1.0E+03	-	1.5E+03	(Use soil gas)	1.5E+00
<i>tert</i> -Butyl alcohol	7.5E-02	5.0E+02	-	3.2E+05	(Use soil gas)	7.5E-02
1,1,1,2-Tetrachloroethane	2.4E-02	5.0E+02	-	4.5E+00	(Use soil gas)	2.4E-02
1,1,2,2-Tetrachloroethane	1.8E-02	1.0E+03	-	6.0E-01	(Use soil gas)	1.8E-02
Tetrachloroethene	7.0E-01	2.3E+02	-	9.5E-01	(Use soil gas)	7.0E-01
Thallium	1.6E+01	2.5E+03	-	1.6E+01		
Toluene	2.9E+00	6.5E+02	-	2.1E+02	(Use soil gas)	2.9E+00
Toxaphene	4.2E-04	1.0E+03	-	1.8E+00		4.2E-04
TPH (gasolines)	8.3E+01	5.0E+02	-	4.5E+02	(Use soil gas)	8.3E+01
TPH (middle distillates)	8.3E+01	5.0E+02	-	4.5E+02	(Use soil gas)	8.3E+01
TPH (residual fuels)	2.5E+03	2.5E+03	-	3.7E+03		
1,2,4-Trichlorobenzene	1.5E+00	1.0E+03	3.0E+01	2.7E+01	(Use soil gas)	1.5E+00
1,1,1-Trichloroethane	7.8E+00	1.0E+03	-	9.5E+02	(Use soil gas)	7.8E+00
1,1,2-Trichloroethane	7.0E-02	5.0E+02	-	1.1E+00	(Use soil gas)	7.0E-02
Trichloroethene	4.6E-01	8.2E+02	6.0E+01	4.1E+00	(Use soil gas)	4.6E-01
2,4,5-Trichlorophenol	1.8E-01	5.0E+02	1.0E+01	1.6E+03	(Use soil gas)	1.8E-01
2,4,6-Trichlorophenol	2.3E-01	1.0E+03	1.0E+01	2.0E+01		2.3E-01

**Lookup Table A-2. ¹Shallow Soil Cleanup Standard Values (<3m bgs)
Commercial/Industrial Land Use**

Commercial/Industrial Land Use (mg/kg)						
Chemical	Final Cleanup Level	Gross Contamination Ceiling Value (Odors, etc.)	Urban Area Ecotoxicity Criteria	Human Health		Groundwater Protection (Soil Leaching)
				Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
		Table F-3		Table I-2	Table E	
Vanadium	2.0E+02	2.5E+03	2.0E+02	2.0E+02		
Vinyl chloride	4.7E-02	1.0E+03	6.0E+01	4.7E-02	(Use soil gas)	8.5E-02
Xylenes	2.3E+00	4.2E+02	-	1.0E+02	(Use soil gas)	2.3E+00
Zinc	6.0E+02	2.5E+03	6.0E+02	6.1E+04		
Electrical Conductivity (mS/cm, USEPA Method 120.1 MOD)	0.0E+00	-	-	-	-	-
Sodium Adsorption Ratio	0.0E+00	-	-	-	-	-

Notes:

1. Shallow soils defined as soils <3 meters below ground surface.

Final level is lowest of ceiling value (nuisance concerns etc.), ecotoxicity, direct-exposure, indoor-air impact, and leaching cleanup standard values.

Soil data should be reported on dry-weight basis (see Section 6.2).

TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.

**Lookup Table B-1. ¹Deep Soil Cleanup Standard Values (>3m bgs)
²Unrestricted Land Use**

² Unrestricted Land Use (mg/kg)					
Chemical	Final Cleanup Level	Gross Contamination Ceiling Value (Odors, etc.) Table F-3	Human Health		Groundwater Protection (Soil Leaching)
			Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
			Table I-3		Table E
Acenaphthene	1.6E+01	2.5E+03		1.7E+04	(Use soil gas)
Acenaphthylene	1.3E+01	1.0E+03	0.0E+00	1.1E+04	(Use soil gas)
Acetone	5.0E-01	1.0E+03	0.0E+00	1.0E+05	(Use soil gas)
Aldrin	1.5E+00	2.5E+03	0.0E+00	1.5E+00	
Anthracene	2.8E+00	1.0E+03	0.0E+00	1.0E+05	(Use soil gas)
Antimony	3.1E+02	2.5E+03	0.0E+00	3.1E+02	
Arsenic	1.5E+01	2.5E+03	0.0E+00	1.5E+01	
Barium	2.5E+03	2.5E+03	0.0E+00	2.6E+03	
Benzene	4.4E-02	8.7E+02	0.0E+00	1.2E+01	(Use soil gas)
Benzo(a)anthracene	1.2E+01	1.0E+03	0.0E+00	1.5E+01	
Benzo(b)fluoranthene	1.5E+01	1.0E+03	0.0E+00	1.5E+01	
Benzo(k)fluoranthene	2.7E+00	1.0E+03	0.0E+00	1.5E+01	
Benzo(g,h,i)perylene	2.7E+01	1.0E+03	0.0E+00	1.1E+04	
Benzo(a)pyrene	1.5E+00	1.0E+03	0.0E+00	1.5E+00	
Beryllium	9.8E+01	2.5E+03	0.0E+00	9.8E+01	
1,1-Biphenyl	6.5E-01	1.0E+03	0.0E+00	2.0E+04	(Use soil gas)
Bis(2-chloroethyl) ether	4.0E-04	1.0E+03	0.0E+00	1.3E+01	(Use soil gas)
Bis(2-chloroisopropyl) ether	1.5E-04	7.9E+02	0.0E+00	3.0E+00	(Use soil gas)
Bis(2-ethylhexyl) phthalate	7.8E+02	1.0E+03	0.0E+00	1.4E+03	
Boron	6.3E+04	no criteria	0.0E+00	6.3E+04	
Bromodichloromethane	1.9E+00	2.5E+03	0.0E+00	5.3E+01	(Use soil gas)
Bromoform (Tribromomethane)	2.2E+00	1.0E+03	0.0E+00	4.8E+03	
Bromomethane	3.9E-01	1.0E+03	0.0E+00	2.9E+01	(Use soil gas)
Cadmium	3.9E+01	2.5E+03	0.0E+00	3.9E+01	
Carbon tetrachloride	1.1E-01	1.0E+03	0.0E+00	1.9E+00	(Use soil gas)

**Lookup Table B-1. ¹Deep Soil Cleanup Standard Values (>3m bgs)
²Unrestricted Land Use**

² Unrestricted Land Use (mg/kg)					
Chemical	Final Cleanup Level	Gross Contamination Ceiling Value (Odors, etc.) Table F-3	Human Health		Groundwater Protection (Soil Leaching)
			Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
			Table I-3		Table E
Chlordane	1.5E+01	2.5E+03	0.0E+00	2.1E+01	
p-Chloroaniline	5.3E-02	2.5E+03	0.0E+00	3.1E+03	
Chlorobenzene	1.5E+00	6.8E+02	0.0E+00	6.8E+02	(Use soil gas)
Chloroethane	8.5E-01	1.0E+03	0.0E+00	4.2E+02	(Use soil gas)
Chloroform	2.1E+00	1.0E+03	0.0E+00	6.3E+01	(Use soil gas)
Chloromethane	6.4E+00	5.0E+02	0.0E+00	3.1E+02	(Use soil gas)
2-Chlorophenol	1.2E-02	5.0E+02	0.0E+00	3.2E+02	(Use soil gas)
Chromium (total)	2.5E+03	2.5E+03	0.0E+00	-	
Chromium III	2.5E+03	2.5E+03	0.0E+00	1.2E+06	
Chromium VI	5.3E-01	2.5E+03	0.0E+00	5.3E-01	
Chrysene	2.3E+01	2.5E+03	0.0E+00	2.4E+03	
Cobalt	9.4E+01	2.5E+03	0.0E+00	9.4E+01	
Copper	2.5E+03	2.5E+03	0.0E+00	3.1E+05	
Cyanide	3.6E-03	5.0E+02	0.0E+00	1.3E+03	
Dibenz(a,h)anthracene	2.4E+00	1.0E+03	0.0E+00	2.4E+00	
Dibromochloromethane	8.3E+00	5.0E+02	0.0E+00	4.6E+02	(Use soil gas)
1,2-dibromo-3-chloropropane	4.5E-03	1.0E+03	0.0E+00	5.3E+00	(Use soil gas)
1,2-Dibromoethane	3.3E-04	1.0E+03	0.0E+00	1.7E+00	(Use soil gas)
1,2-Dichlorobenzene	1.1E+00	6.0E+02	0.0E+00	6.0E+02	(Use soil gas)
1,3-Dichlorobenzene	7.4E+00	6.0E+02	0.0E+00	6.0E+02	(Use soil gas)
1,4-Dichlorobenzene	5.9E-01	1.0E+03	0.0E+00	1.1E+02	(Use soil gas)
3,3-Dichlorobenzidine	7.7E-03	1.0E+03	0.0E+00	3.1E+01	
Dichlorodiphenyldichloroethane (DDD)	1.2E+02	1.0E+03	0.0E+00	1.2E+02	
Dichlorodiphenyldichloroethene (DDE)	8.7E+01	1.0E+03	0.0E+00	8.7E+01	
Dichlorodiphenyltrichloroethane (DDT)	4.3E+00	2.5E+03	0.0E+00	8.7E+01	

**Lookup Table B-1. ¹Deep Soil Cleanup Standard Values (>3m bgs)
²Unrestricted Land Use**

² Unrestricted Land Use (mg/kg)					
Chemical	Final Cleanup Level	Gross Contamination Ceiling Value (Odors, etc.) Table F-3	Human Health		Groundwater Protection (Soil Leaching)
			Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
			Table I-3		Table E
1,1-Dichloroethane	2.0E-01	1.0E+03	0.0E+00	2.0E+02	(Use soil gas)
1,2-Dichloroethane	4.5E-03	1.0E+03	0.0E+00	2.1E+01	(Use soil gas)
1,1-Dichloroethene	1.0E+00	1.0E+03	0.0E+00	8.0E+02	(Use soil gas)
<i>cis</i> -1,2-Dichloroethene	1.9E-01	5.0E+02	0.0E+00	2.7E+02	(Use soil gas)
<i>trans</i> -1,2-Dichloroethene	6.7E-01	1.0E+03	0.0E+00	4.2E+02	(Use soil gas)
2,4-Dichlorophenol	3.0E-01	1.0E+03	0.0E+00	2.2E+03	
1,2-Dichloropropane	1.2E-01	5.0E+02	0.0E+00	3.7E+01	(Use soil gas)
1,3-Dichloropropene	5.9E-02	1.0E+03	0.0E+00	1.6E+01	(Use soil gas)
Dieldrin	2.3E-03	2.5E+03	0.0E+00	1.6E+00	
Diethyl phthalate	3.5E-02	1.0E+03	0.0E+00	3.2E+05	
Dimethyl phthalate	3.5E-02	1.0E+03	0.0E+00	4.0E+06	
2,4-Dimethylphenol	6.7E-01	5.0E+02	0.0E+00	1.5E+04	(Use soil gas)
2,4-Dinitrophenol	4.2E-02	1.0E+03	0.0E+00	1.1E+04	
2,4-Dinitrotoluene	3.9E-04	1.0E+03	0.0E+00	5.6E+01	
1,4-Dioxane	1.8E-03	1.0E+03	0.0E+00	1.4E+03	
Dioxin (2,3,7,8-TCDD)	2.3E-04	no criteria	0.0E+00	2.3E-04	
Endosulfan	4.6E-03	1.0E+03	0.0E+00	3.1E+03	
Endrin	6.5E-04	1.0E+03	0.0E+00	1.6E+02	
Ethylbenzene	3.3E+00	4.0E+02	0.0E+00	2.1E+02	(Use soil gas)
Fluoranthene	6.0E+01	1.0E+03	0.0E+00	1.4E+04	
Fluorene	8.9E+00	1.0E+03	0.0E+00	1.2E+04	(Use soil gas)
Heptachlor	1.3E-02	2.5E+03	0.0E+00	5.8E+00	
Heptachlor epoxide	1.4E-02	2.5E+03	0.0E+00	2.9E+00	
Hexachlorobenzene	1.6E+01	1.0E+03	0.0E+00	1.6E+01	
Hexachlorobutadiene	2.2E+00	1.0E+03	0.0E+00	1.5E+02	

**Lookup Table B-1. ¹Deep Soil Cleanup Standard Values (>3m bgs)
²Unrestricted Land Use**

² Unrestricted Land Use (mg/kg)					
Chemical	Final Cleanup Level	Gross Contamination Ceiling Value (Odors, etc.) Table F-3	Human Health		Groundwater Protection (Soil Leaching)
			Direct Exposure Table I-3	Vapor Intrusion Into Buildings	Drinking Water Resource Table E
		<i>γ</i> -Hexachlorocyclohexane (Lindane)	9.8E-03	1.0E+03	0.0E+00
Hexachloroethane	3.0E+00	1.0E+03	0.0E+00	4.0E+02	
Indeno(1,2,3-c,d)pyrene	1.3E+01	1.0E+03	0.0E+00	2.4E+01	
Lead	7.5E+02	2.5E+03	0.0E+00	7.5E+02	
Mercury (elemental)	5.8E+01	1.0E+03	0.0E+00	5.8E+01	(Use soil gas)
Methoxychlor	1.9E+01	1.0E+03	0.0E+00	-	
Methylene chloride	7.7E-02	1.0E+03	0.0E+00	6.3E+02	(Use soil gas)
Methyl ethyl ketone	3.9E+00	1.0E+03	0.0E+00	3.4E+04	(Use soil gas)
Methyl isobutyl ketone	2.8E+00	5.0E+02	0.0E+00	1.7E+04	(Use soil gas)
Methyl mercury	4.1E+01	5.0E+02	0.0E+00	4.1E+01	
2-Methylnaphthalene	2.5E-01	1.0E+03	0.0E+00	1.4E+03	(Use soil gas)
<i>tert</i> -Butyl methyl ether	2.3E-02	5.0E+02	0.0E+00	2.8E+03	(Use soil gas)
Molybdenum	2.5E+03	2.5E+03	0.0E+00	3.9E+03	
Naphthalene	3.4E+00	1.0E+03	0.0E+00	1.3E+02	(Use soil gas)
Nickel	2.6E+02	2.5E+03	0.0E+00	2.6E+02	
Pentachlorophenol	9.9E+01	1.0E+03	0.0E+00	9.9E+01	
Perchlorate	5.4E+02	2.5E+03	0.0E+00	5.4E+02	
Phenanthrene	1.1E+01	1.0E+03	0.0E+00	1.1E+04	(Use soil gas)
Phenol	7.6E-02	1.0E+03	0.0E+00	2.3E+05	
Polychlorinated biphenyls (PCBs)	6.3E+00	1.0E+03	0.0E+00	6.7E+00	
Pyrene	8.5E+01	1.0E+03	0.0E+00	2.1E+04	(Use soil gas)
Selenium	2.5E+03	2.5E+03	0.0E+00	3.9E+03	
Silver	2.5E+03	2.5E+03	0.0E+00	3.9E+03	
Styrene	1.5E+00	1.0E+03	0.0E+00	1.5E+03	(Use soil gas)
<i>tert</i> -Butyl alcohol	7.5E-02	5.0E+02	0.0E+00	3.2E+05	(Use soil gas)

**Lookup Table B-1. ¹Deep Soil Cleanup Standard Values (>3m bgs)
²Unrestricted Land Use**

² Unrestricted Land Use (mg/kg)					
Chemical	Final Cleanup Level	Gross Contamination Ceiling Value (Odors, etc.) Table F-3	Human Health		Groundwater Protection (Soil Leaching)
			Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
			Table I-3		Table E
1,1,1,2-Tetrachloroethane	2.4E-02	5.0E+02	0.0E+00	1.9E+02	(Use soil gas)
1,1,2,2-Tetrachloroethane	1.8E-02	1.0E+03	0.0E+00	2.4E+01	(Use soil gas)
Tetrachloroethene	7.0E-01	2.3E+02	0.0E+00	3.0E+01	(Use soil gas)
Thallium	6.2E+01	2.5E+03	0.0E+00	6.2E+01	
Toluene	2.9E+00	6.5E+02	0.0E+00	6.5E+02	(Use soil gas)
Toxaphene	4.2E-04	1.0E+03	0.0E+00	2.2E+01	
TPH (gasolines)	8.3E+01	5.0E+03	0.0E+00	4.2E+03	(Use soil gas)
TPH (middle distillates)	8.3E+01	5.0E+03	0.0E+00	4.2E+03	(Use soil gas)
TPH (residual fuels)	5.0E+03	5.0E+03	0.0E+00	1.2E+04	
1,2,4-Trichlorobenzene	1.5E+00	1.0E+03	0.0E+00	3.2E+02	(Use soil gas)
1,1,1-Trichloroethane	7.8E+00	1.0E+03	0.0E+00	1.2E+03	(Use soil gas)
1,1,2-Trichloroethane	7.0E-02	5.0E+02	0.0E+00	4.6E+01	(Use soil gas)
Trichloroethene	4.6E-01	1.0E+03	0.0E+00	1.7E+02	(Use soil gas)
2,4,5-Trichlorophenol	1.8E-01	5.0E+02	0.0E+00	1.7E+04	(Use soil gas)
2,4,6-Trichlorophenol	2.3E-01	1.0E+03	0.0E+00	7.7E+01	
Vanadium	7.7E+02	2.5E+03	0.0E+00	7.7E+02	
Vinyl chloride	8.5E-02	1.0E+03	0.0E+00	2.0E+00	(Use soil gas)
Xylenes	2.3E+00	4.2E+02	0.0E+00	4.2E+02	(Use soil gas)
Zinc	2.5E+03	2.5E+03	0.0E+00	2.3E+05	
Electrical Conductivity (mS/cm, USEPA Method 120.1 MOD)	not applicable	-	-	-	-
Sodium Adsorption Ratio	not applicable	-	-	-	-

Notes:

1. Deep soils defined as soils >3 meters below ground surface (or shallower with institutional controls).

**Lookup Table B-1. ¹Deep Soil Cleanup Standard Values (>3m bgs)
²Unrestricted Land Use**

² Unrestricted Land Use (mg/kg)					
Chemical	Final Cleanup Level	Gross Contamination Ceiling Value (Odors, etc.)	Human Health		Groundwater Protection (Soil Leaching)
			Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
		Table F-3	Table I-3		Table E
<p>2. Unrestricted Land Use protection values generally considered adequate for other sensitive uses.</p> <p>Final Level is lowest of ceiling values (nuisance concerns etc.), direct-exposure, indoor-air impact, and leaching cleanup standard values.</p> <p>Soil data should be reported on dry-weight basis (see Section 6.2).</p> <p>TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.</p>					

**Lookup Table B-2. 1Deep Soil Cleanup Standard Values (>3m bgs)
Commercial/Industrial Land Use**

Chemical	Commercial/Industrial Land Use (mg/kg)				
	Final ESL	Gross Contamination Ceiling Value (Odors, etc.) Table F-3	Human Health		Groundwater Protection (Soil Leaching)
			Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
			Table I-3		Table E
Acenaphthene	1.6E+01	5.0E+03	1.7E+04	(Use soil gas)	1.6E+01
Acenaphthylene	1.3E+01	2.5E+03	1.1E+04	(Use soil gas)	1.3E+01
Acetone	5.0E-01	2.5E+03	1.0E+05	(Use soil gas)	5.0E-01
Aldrin	1.5E+00	5.0E+03	1.5E+00		5.0E+00
Anthracene	2.8E+00	2.5E+03	1.0E+05	(Use soil gas)	2.8E+00
Antimony	3.1E+02	5.0E+03	3.1E+02		
Arsenic	1.5E+01	5.0E+03	1.5E+01		
Barium	2.6E+03	5.0E+03	2.6E+03		
Benzene	4.4E-02	8.7E+02	1.2E+01	(Use soil gas)	4.4E-02
Benzo(a)anthracene	1.2E+01	2.5E+03	1.5E+01		1.2E+01
Benzo(b)fluoranthene	1.5E+01	2.5E+03	1.5E+01		4.6E+01
Benzo(k)fluoranthene	2.7E+00	2.5E+03	1.5E+01		2.7E+00
Benzo(g,h,i)perylene	2.7E+01	2.5E+03	1.1E+04		2.7E+01
Benzo(a)pyrene	1.5E+00	2.5E+03	1.5E+00		1.3E+02
Beryllium	9.8E+01	5.0E+03	9.8E+01		
1,1-Biphenyl	6.5E-01	2.5E+03	2.0E+04	(Use soil gas)	6.5E-01
Bis(2-chloroethyl) ether	4.0E-04	2.5E+03	1.3E+01	(Use soil gas)	4.0E-04
Bis(2-chloroisopropyl) ether	1.5E-04	7.9E+02	3.0E+00	(Use soil gas)	1.5E-04
Bis(2-ethylhexyl) phthalate	7.8E+02	2.5E+03	1.4E+03		7.8E+02
Boron	6.3E+04	no criteria	6.3E+04		
Bromodichloromethane	1.9E+00	4.8E+03	5.3E+01	(Use soil gas)	1.9E+00
Bromoform (Tribromomethane)	2.2E+00	2.5E+03	4.8E+03		2.2E+00
Bromomethane	3.9E-01	2.5E+03	2.9E+01	(Use soil gas)	3.9E-01
Cadmium	3.9E+01	5.0E+03	3.9E+01		
Carbon tetrachloride	1.1E-01	1.1E+03	1.9E+00	(Use soil gas)	1.1E-01
Chlordane	1.5E+01	5.0E+03	2.1E+01		1.5E+01
p-Chloroaniline	5.3E-02	5.0E+03	3.1E+03		5.3E-02
Chlorobenzene	1.5E+00	6.8E+02	6.8E+02	(Use soil gas)	1.5E+00
Chloroethane	8.5E-01	1.6E+03	4.2E+02	(Use soil gas)	8.5E-01
Chloroform	2.1E+00	2.5E+03	6.3E+01	(Use soil gas)	2.1E+00
Chloromethane	6.4E+00	1.0E+03	3.1E+02	(Use soil gas)	6.4E+00
2-Chlorophenol	1.2E-02	1.0E+03	3.2E+02	(Use soil gas)	1.2E-02
Chromium (total)	5.0E+03	5.0E+03	-		

**Lookup Table B-2. 1Deep Soil Cleanup Standard Values (>3m bgs)
Commercial/Industrial Land Use**

Chemical	Commercial/Industrial Land Use (mg/kg)				
	Final ESL	Gross Contamination Ceiling Value (Odors, etc.) Table F-3	Human Health		Groundwater Protection (Soil Leaching)
			Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
			Table I-3		Table E
Chromium III	5.0E+03	5.0E+03	1.2E+06		
Chromium VI	5.3E-01	5.0E+03	5.3E-01		
Chrysene	2.3E+01	5.0E+03	2.4E+03		2.3E+01
Cobalt	9.4E+01	5.0E+03	9.4E+01		
Copper	5.0E+03	5.0E+03	3.1E+05		
Cyanide	3.6E-03	1.0E+03	1.3E+03		3.6E-03
Dibenz(a,h)anthracene	2.4E+00	2.5E+03	2.4E+00		9.9E+00
Dibromochloromethane	8.3E+00	1.0E+03	4.6E+02	(Use soil gas)	8.3E+00
1,2-dibromo-3-chloropropane	4.5E-03	1.1E+03	5.3E+00	(Use soil gas)	4.5E-03
1,2-Dibromoethane	3.3E-04	2.5E+03	1.7E+00	(Use soil gas)	3.3E-04
1,2-Dichlorobenzene	1.1E+00	6.0E+02	6.0E+02	(Use soil gas)	1.1E+00
1,3-Dichlorobenzene	7.4E+00	6.0E+02	6.0E+02	(Use soil gas)	7.4E+00
1,4-Dichlorobenzene	5.9E-01	2.5E+03	1.1E+02	(Use soil gas)	5.9E-01
3,3-Dichlorobenzidine	7.7E-03	2.5E+03	3.1E+01		7.7E-03
Dichlorodiphenylchloroethane (DDD)	1.2E+02	2.5E+03	1.2E+02		7.5E+02
Dichlorodiphenylchloroethene (DDE)	8.7E+01	2.5E+03	8.7E+01		1.1E+03
Dichlorodiphenyltrichloroethane (DDT)	4.3E+00	5.0E+03	8.7E+01		4.3E+00
1,1-Dichloroethane	2.0E-01	1.7E+03	2.0E+02	(Use soil gas)	2.0E-01
1,2-Dichloroethane	4.5E-03	1.8E+03	2.1E+01	(Use soil gas)	4.5E-03
1,1-Dichloroethene	1.0E+00	1.5E+03	8.0E+02	(Use soil gas)	1.0E+00
cis-1,2-Dichloroethene	1.9E-01	1.0E+03	2.7E+02	(Use soil gas)	1.9E-01
trans-1,2-Dichloroethene	6.7E-01	2.5E+03	4.2E+02	(Use soil gas)	6.7E-01
2,4-Dichlorophenol	3.0E-01	2.5E+03	2.2E+03		3.0E-01
1,2-Dichloropropane	1.2E-01	1.0E+03	3.7E+01	(Use soil gas)	1.2E-01
1,3-Dichloropropene	5.9E-02	1.4E+03	1.6E+01	(Use soil gas)	5.9E-02
Dieldrin	2.3E-03	5.0E+03	1.6E+00		2.3E-03
Diethyl phthalate	3.5E-02	2.5E+03	3.2E+05		3.5E-02
Dimethyl phthalate	3.5E-02	2.5E+03	4.0E+06		3.5E-02
2,4-Dimethylphenol	6.7E-01	1.0E+03	1.5E+04	(Use soil gas)	6.7E-01
2,4-Dinitrophenol	4.2E-02	2.5E+03	1.1E+04		4.2E-02
2,4-Dinitrotoluene	3.9E-04	2.5E+03	5.6E+01		3.9E-04
1,4-Dioxane	1.8E-03	2.5E+03	1.4E+03		1.8E-03
Dioxin (2,3,7,8-TCDD)	2.3E-04	no criteria	2.3E-04		

**Lookup Table B-2. 1Deep Soil Cleanup Standard Values (>3m bgs)
Commercial/Industrial Land Use**

Chemical	Commercial/Industrial Land Use (mg/kg)				
	Final ESL	Gross Contamination Ceiling Value (Odors, etc.) Table F-3	Human Health		Groundwater Protection (Soil Leaching)
			Direct Exposure	Vapor Intrusion Into Buildings	Drinking Water Resource
			Table I-3		Table E
Endosulfan	4.6E-03	2.5E+03	3.1E+03		4.6E-03
Endrin	6.5E-04	2.5E+03	1.6E+02		6.5E-04
Ethylbenzene	3.3E+00	4.0E+02	2.1E+02	(Use soil gas)	3.3E+00
Fluoranthene	6.0E+01	2.5E+03	1.4E+04		6.0E+01
Fluorene	8.9E+00	2.5E+03	1.2E+04	(Use soil gas)	8.9E+00
Heptachlor	1.3E-02	5.0E+03	5.8E+00		1.3E-02
Heptachlor epoxide	1.4E-02	5.0E+03	2.9E+00		1.4E-02
Hexachlorobenzene	1.6E+01	2.5E+03	1.6E+01		7.9E+02
Hexachlorobutadiene	2.2E+00	2.5E+03	1.5E+02		2.2E+00
γ -Hexachlorocyclohexane (Lindane)	9.8E-03	2.5E+03	1.6E+02		9.8E-03
Hexachloroethane	3.0E+00	2.5E+03	4.0E+02		3.0E+00
Indeno(1,2,3-c,d)pyrene	1.3E+01	2.5E+03	2.4E+01		1.3E+01
Lead	7.5E+02	5.0E+03	7.5E+02		
Mercury (elemental)	5.8E+01	2.5E+03	5.8E+01	(Use soil gas)	
Methoxychlor	1.9E+01	2.5E+03	-		1.9E+01
Methylene chloride	7.7E-02	2.4E+03	6.3E+02	(Use soil gas)	7.7E-02
Methyl ethyl ketone	3.9E+00	2.5E+03	3.4E+04	(Use soil gas)	3.9E+00
Methyl isobutyl ketone	2.8E+00	1.0E+03	1.7E+04	(Use soil gas)	2.8E+00
Methyl mercury	4.1E+01	1.0E+03	4.1E+01		
2-Methylnaphthalene	2.5E-01	2.5E+03	1.4E+03	(Use soil gas)	2.5E-01
<i>tert</i> -Butyl methyl ether	2.3E-02	1.0E+03	2.8E+03	(Use soil gas)	2.3E-02
Molybdenum	3.9E+03	5.0E+03	3.9E+03		
Naphthalene	3.4E+00	2.5E+03	1.3E+02	(Use soil gas)	3.4E+00
Nickel	2.6E+02	5.0E+03	2.6E+02		
Pentachlorophenol	9.9E+01	2.5E+03	9.9E+01		2.7E+06
Perchlorate	5.4E+02	5.0E+03	5.4E+02		
Phenanthrene	1.1E+01	2.5E+03	1.1E+04	(Use soil gas)	1.1E+01
Phenol	7.6E-02	2.5E+03	2.3E+05		7.6E-02
Polychlorinated biphenyls (PCBs)	6.3E+00	2.5E+03	6.7E+00		6.3E+00
Pyrene	8.5E+01	2.5E+03	2.1E+04	(Use soil gas)	8.5E+01
Selenium	3.9E+03	5.0E+03	3.9E+03		
Silver	3.9E+03	5.0E+03	3.9E+03		
Styrene	1.5E+00	1.5E+03	1.5E+03	(Use soil gas)	1.5E+00

**Lookup Table B-2. 1Deep Soil Cleanup Standard Values (>3m bgs)
Commercial/Industrial Land Use**

Chemical	Commercial/Industrial Land Use (mg/kg)				
	Final ESL	Gross Contamination Ceiling Value (Odors, etc.) Table F-3	Human Health		Groundwater Protection (Soil Leaching)
			Direct Exposure Table I-3	Vapor Intrusion Into Buildings	Drinking Water Resource Table E
<i>tert</i> -Butyl alcohol	7.5E-02	1.0E+03	3.2E+05	(Use soil gas)	7.5E-02
1,1,1,2-Tetrachloroethane	2.4E-02	1.0E+03	1.9E+02	(Use soil gas)	2.4E-02
1,1,2,2-Tetrachloroethane	1.8E-02	1.7E+03	2.4E+01	(Use soil gas)	1.8E-02
Tetrachloroethene	7.0E-01	2.3E+02	3.0E+01	(Use soil gas)	7.0E-01
Thallium	6.2E+01	5.0E+03	6.2E+01		
Toluene	2.9E+00	6.5E+02	6.5E+02	(Use soil gas)	2.9E+00
Toxaphene	4.2E-04	2.5E+03	2.2E+01		4.2E-04
TPH (gasolines)	8.3E+01	5.0E+03	4.2E+03	(Use soil gas)	8.3E+01
TPH (middle distillates)	8.3E+01	5.0E+03	4.2E+03	(Use soil gas)	8.3E+01
TPH (residual fuels)	5.0E+03	5.0E+03	1.2E+04		
1,2,4-Trichlorobenzene	1.5E+00	2.5E+03	3.2E+02	(Use soil gas)	1.5E+00
1,1,1-Trichloroethane	7.8E+00	1.2E+03	1.2E+03	(Use soil gas)	7.8E+00
1,1,2-Trichloroethane	7.0E-02	1.0E+03	4.6E+01	(Use soil gas)	7.0E-02
Trichloroethene	4.6E-01	1.3E+03	1.7E+02	(Use soil gas)	4.6E-01
2,4,5-Trichlorophenol	1.8E-01	1.0E+03	1.7E+04	(Use soil gas)	1.8E-01
2,4,6-Trichlorophenol	2.3E-01	2.5E+03	7.7E+01		2.3E-01
Vanadium	7.7E+02	5.0E+03	7.7E+02		
Vinyl chloride	8.5E-02	2.5E+03	2.0E+00	(Use soil gas)	8.5E-02
Xylenes	2.3E+00	4.2E+02	4.2E+02	(Use soil gas)	2.3E+00
Zinc	5.0E+03	5.0E+03	2.3E+05		

Notes:

1. Deep soils defined as soils >3 meters below ground surface.

Final Level is lowest of ceiling values (nuisance concerns etc.), direct-exposure, indoor-air impact, and leaching cleanup standard values.

Soil data should be reported on dry-weight basis.

TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.

All water associated with the Snake River Plain Aquifer is considered to be a drinking water source.

**Lookup Table C-1. Groundwater Protection Values
for Evaluation of Potential Vapor Intrusion Concerns
(volatile chemicals only)**

Chemical	Physical State		Unrestricted Land Use	Commercial/Industrial Land Use
			(µg/L)	(µg/L)
Acenaphthene	V	S	4.2E+03	4.2E+03
Acenaphthylene	V	S	(Use soil gas)	(Use soil gas)
Acetone	V	L	5.3E+07	1.5E+08
Aldrin	NV	S		
Anthracene	V	S	4.3E+01	4.3E+01
Antimony	NV	S		
Arsenic	NV	S		
Barium	NV	S		
Benzene	V	L	5.4E+02	1.8E+03
Benzo(a)anthracene	NV	S		
Benzo(b)fluoranthene	NV	S		
Benzo(k)fluoranthene	NV	S		
Benzo(g,h,i)perylene	NV	S		
Benzo(a)pyrene	NV	S		
Beryllium	NV	S		
1,1-Biphenyl	V	S	(Use soil gas)	(Use soil gas)
Bis(2-chloroethyl) ether	V	L	6.5E+01	2.2E+02
Bis(2-chloroisopropyl) ether	V	L	(Use soil gas)	(Use soil gas)
Bis(2-ethylhexyl) phthalate	NV	S		
Boron	NV	S		
Bromodichloromethane	V	L	1.7E+02	5.6E+02
Bromoform (Tribromomethane)	NV	S		
Bromomethane	V	G	5.8E+02	1.6E+03
Cadmium	NV	S		
Carbon tetrachloride	V	L	9.3E+00	3.1E+01
Chlordane	NV	S		
p-Chloroaniline	NV	S		

**Lookup Table C-1. Groundwater Protection Values
for Evaluation of Potential Vapor Intrusion Concerns
(volatile chemicals only)**

Chemical	Physical State		Unrestricted Land Use	Commercial/Industrial Land Use
			(µg/L)	(µg/L)
Chlorobenzene	V	L	1.3E+04	3.7E+04
Chloroethane	V	G	8.2E+02	2.7E+03
Chloroform	V	L	3.3E+02	1.1E+03
Chloromethane	V	G	4.1E+01	1.4E+02
2-Chlorophenol	V	L	5.3E+03	1.5E+04
Chromium (total)	NV	S		
Chromium III	NV	S		
Chromium VI	NV	S		
Chrysene	NV	S	(Use soil gas)	(Use soil gas)
Cobalt	NV	S		
Copper	NV	S		
Cyanide	NV	S	(Use soil gas)	(Use soil gas)
Dibenz(a,h)anthracene	NV	S		
Dibromochloromethane	V	S	1.7E+02	5.7E+02
1,2-dibromo-3-chloropropane	V	L	(Use soil gas)	(Use soil gas)
1,2-Dibromoethane	V	S	1.5E+02	5.1E+02
1,2-Dichlorobenzene	V	L	7.7E+04	1.6E+05
1,3-Dichlorobenzene	V	L	(Use soil gas)	(Use soil gas)
1,4-Dichlorobenzene	V	S	3.4E+02	1.1E+03
3,3-Dichlorobenzidine	NV	S		
Dichlorodiphenyldichloroethane (DDD)	NV	S		
Dichlorodiphenyldichloroethene (DDE)	NV	S		
Dichlorodiphenyltrichloroethane (DDT)	NV	S		
1,1-Dichloroethane	V	L	1.0E+03	3.4E+03
1,2-Dichloroethane	V	L	2.0E+02	6.9E+02
1,1-Dichloroethene	V	L	6.3E+03	1.8E+04
<i>cis</i> -1,2-Dichloroethene	V	L	6.2E+03	1.7E+04

**Lookup Table C-1. Groundwater Protection Values
for Evaluation of Potential Vapor Intrusion Concerns
(volatile chemicals only)**

Chemical	Physical State		Unrestricted Land Use	Commercial/Industrial Land Use
			(µg/L)	(µg/L)
<i>trans</i> -1,2-Dichloroethene	V	L	6.7E+03	1.9E+04
2,4-Dichlorophenol	NV	S		
1,2-Dichloropropane	V	L	2.8E+02	9.3E+02
1,3-Dichloropropene	V	L	5.3E+01	1.8E+02
Dieldrin	NV	S		
Diethyl phthalate	NV	S		
Dimethyl phthalate	NV	S		
2,4-Dimethylphenol	V	S	2.5E+06	7.1E+06
2,4-Dinitrophenol	NV	S		
2,4-Dinitrotoluene	NV	S		
1,4-Dioxane	NV	L		
Dioxin (2,3,7,8-TCDD)	NV	S		
Endosulfan	NV	S		
Endrin	NV	S		
Ethylbenzene	V	L	1.7E+05	1.7E+05
Fluoranthene	NV	S		
Fluorene	V	S	1.9E+03	1.9E+03
Heptachlor	NV	S		
Heptachlor epoxide	NV	S		
Hexachlorobenzene	NV	S		
Hexachlorobutadiene	NV	S		
γ-Hexachlorocyclohexane (Lindane)	NV	S		
Hexachloroethane	NV	S		
Indeno(1,2,3-c,d)pyrene	NV	S		
Lead	NV	S		
Mercury (elemental)	V	S	(Use soil gas)	(Use soil gas)
Methoxychlor	NV	S		

**Lookup Table C-1. Groundwater Protection Values
for Evaluation of Potential Vapor Intrusion Concerns
(volatile chemicals only)**

Chemical	Physical State		Unrestricted Land Use	Commercial/Industrial Land Use
			(µg/L)	(µg/L)
Methylene chloride	V	L	2.4E+03	8.1E+03
Methyl ethyl ketone	V	L	2.4E+07	6.8E+07
Methyl isobutyl ketone	V	L	3.0E+06	8.4E+06
Methyl mercury	NV	S		
2-Methylnaphthalene	V	S	2.6E+04	2.6E+04
<i>tert</i> -Butyl methyl ether	V	L	2.4E+04	8.0E+04
Molybdenum	NV	S		
Naphthalene	V	S	3.2E+03	1.1E+04
Nickel	NV	S		
Pentachlorophenol	NV	S		
Perchlorate	NV	S		
Phenanthrene	V	S	(Use soil gas)	(Use soil gas)
Phenol	NV	S		
Polychlorinated biphenyls (PCBs)	NV	S		
Pyrene	V	S	1.4E+02	1.4E+02
Selenium	NV	S		
Silver	NV	S		
Styrene	V	L	3.1E+05	3.1E+05
<i>tert</i> -Butyl alcohol			(Use soil gas)	(Use soil gas)
1,1,1,2-Tetrachloroethane	V	L	(Use soil gas)	(Use soil gas)
1,1,2,2-Tetrachloroethane	V	L	1.9E+02	6.4E+02
Tetrachloroethene	V	L	1.2E+02	4.2E+02
Thallium	NV	S		
Toluene	V	L	3.8E+05	5.3E+05
Toxaphene	NV	S		
TPH (gasolines)	V	L	(Use soil gas)	(Use soil gas)
TPH (middle distillates)	V	L	(Use soil gas)	(Use soil gas)

**Lookup Table C-1. Groundwater Protection Values
for Evaluation of Potential Vapor Intrusion Concerns
(volatile chemicals only)**

Chemical	Physical State		Unrestricted Land Use	Commercial/Industrial Land Use
			(µg/L)	(µg/L)
TPH (residual fuels)	NV	L/S		
1,2,4-Trichlorobenzene	V	L	2.5E+03	7.1E+03
1,1,1-Trichloroethane	V	L	1.3E+05	3.6E+05
1,1,2-Trichloroethane	V	L	3.5E+02	1.2E+03
Trichloroethene	V	L	5.3E+02	1.8E+03
2,4,5-Trichlorophenol	V	S	8.3E+05	1.2E+06
2,4,6-Trichlorophenol	NV	S		
Vanadium	NV	S		
Vinyl chloride	V	G	3.8E+00	1.3E+01
Xylenes	V	L	1.6E+05	1.6E+05
Zinc	NV	S		

Notes:

High permeability soil: One meter dry sandy soil (92% sand, 5% silt, 3% clay) over one meter moist clayey loam (33% sand, 34% silt, 33% clay).

Protection values calculated using spreadsheet provided with User's Guide for the Johnson and Ettinger Indoor Air model (1991) for Subsurface Vapor Intrusion Into Buildings (USEPA 2003). Assumed vadose-zone thickness/depth to groundwater three meters.

Physical state of chemical at ambient conditions (V - volatile, NV - nonvolatile, S - solid, L - liquid, G - gas).

Chemical considered to be volatile if Henry's Law constant (atm m³/mole) >10⁻⁵ and molecular weight <200.

Dibromochloromethane, dibromochloropropane and pyrene considered volatile for purposes of modeling (USEPA 2004).

Target cancer risk = 1E-06, Target Hazard Quotient = 0.2

**Lookup Table C-2. Shallow Soil Gas Protection Values
for Evaluation of Potential Vapor Intrusion Concerns
(volatile chemicals only)**

Chemical	Physical State		Unrestricted Use Exposure			Commercial/Industrial Land Use		
			Lowest Residential	Carcinogenic Effects	Noncarcinogenic Effects	Lowest C/I	Carcinogenic Effects	Noncarcinogenic Effects
			($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)
Acenaphthene	V	S	4.4E+04		4.4E+04	1.2E+05		1.2E+05
Acenaphthylene	V	S	2.2E+04		2.2E+04	6.1E+04		6.1E+04
Acetone	V	L	6.6E+05		6.6E+05	1.8E+06		1.8E+06
Aldrin	NV	S						
Anthracene	V	S	2.2E+05		2.2E+05	6.1E+05		6.1E+05
Antimony	NV	S						
Arsenic	NV	S						
Barium	NV	S						
Benzene	V	L	8.4E+01	8.4E+01	6.3E+03	2.8E+02	2.8E+02	1.8E+04
Benzo(a)anthracene	NV	S						
Benzo(b)fluoranthene	NV	S						
Benzo(k)fluoranthene	NV	S						
Benzo(g,h,i)perylene	NV	S						
Benzo(a)pyrene	NV	S						
Beryllium	NV	S						
1,1-Biphenyl	V	S						
Bis(2-chloroethyl) ether	V	L	7.4E+00	7.4E+00		2.5E+01	2.5E+01	
Bis(2-chloroisopropyl) ether	V	L	3.4E+00	3.4E+00	2.9E+04	1.2E+01	1.2E+01	8.2E+04
Bis(2-ethylhexyl) phthalate	NV	S						
Boron	NV	S						
Bromodichloromethane	V	L	1.4E+02	1.4E+02	1.5E+04	4.6E+02	4.6E+02	4.1E+04
Bromoform (Tribromomethane)	NV	S						
Bromomethane	V	G	1.0E+03		1.0E+03	2.9E+03		2.9E+03
Cadmium	NV	S						
Carbon tetrachloride	V	L	1.9E+01	1.9E+01	8.3E+03	6.3E+01	6.3E+01	2.3E+04
Chlordane	NV	S						

**Lookup Table C-2. Shallow Soil Gas Protection Values
for Evaluation of Potential Vapor Intrusion Concerns
(volatile chemicals only)**

Chemical	Physical State		Unrestricted Use Exposure			Commercial/Industrial Land Use		
			Lowest Residential	Carcinogenic Effects	Noncarcinogenic Effects	Lowest C/I	Carcinogenic Effects	Noncarcinogenic Effects
			($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)
p-Chloroaniline	NV	S						
Chlorobenzene	V	L	2.1E+05		2.1E+05	5.8E+05		5.8E+05
Chloroethane	V	G	2.1E+04		2.1E+04	5.8E+04		5.8E+04
Chloroform	V	L	4.6E+02	4.6E+02	6.3E+04	1.5E+03	1.5E+03	1.8E+05
Chloromethane	V	G	1.9E+04		1.9E+04	5.3E+04		5.3E+04
2-Chlorophenol	V	L	3.7E+03		3.7E+03	1.0E+04		1.0E+04
Chromium (total)	NV	S						
Chromium III	NV	S						
Chromium VI	NV	S						
Chrysene	NV	S						
Cobalt	NV	S						
Copper	NV	S						
Cyanide	NV	S	1.5E+04		1.5E+04	4.1E+04		4.1E+04
Dibenz(a,h)anthracene	NV	S						
Dibromochloromethane	V	S						
1,2-dibromo-3-chloropropane	V	L	1.3E+00	1.3E+00	4.2E+01	4.3E+00	4.3E+00	1.2E+02
1,2-Dibromoethane	V	S	4.1E+00	4.1E+00	1.9E+03	1.4E+01	1.4E+01	5.3E+03
1,2-Dichlorobenzene	V	L	4.2E+04		4.2E+04	1.2E+05		1.2E+05
1,3-Dichlorobenzene	V	L	2.2E+04		2.2E+04	6.1E+04		6.1E+04
1,4-Dichlorobenzene	V	S	2.2E+02	2.2E+02	1.7E+05	7.4E+02	7.4E+02	4.7E+05
3,3-Dichlorobenzidine	NV	S						
Dichlorodipenyldichloroethane (DDD)	NV	S						
Dichlorodipenyldichloroethene (DDE)	NV	S						
Dichlorodipenyltrichloroethane (DDT)	NV	S						
1,1-Dichloroethane	V	L	1.5E+03	1.5E+03	1.0E+05	5.1E+03	5.1E+03	2.9E+05
1,2-Dichloroethane	V	L	9.4E+01	9.4E+01	1.0E+03	3.1E+02	3.1E+02	2.9E+03

**Lookup Table C-2. Shallow Soil Gas Protection Values
for Evaluation of Potential Vapor Intrusion Concerns
(volatile chemicals only)**

Chemical	Physical State		Unrestricted Use Exposure			Commercial/Industrial Land Use		
			Lowest Residential	Carcinogenic Effects	Noncarcinogenic Effects	Lowest C/I	Carcinogenic Effects	Noncarcinogenic Effects
			($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)
1,1-Dichloroethene	V	L	4.2E+04		4.2E+04	1.2E+05		1.2E+05
<i>cis</i> -1,2-Dichloroethene	V	L	7.3E+03		7.3E+03	2.0E+04		2.0E+04
<i>trans</i> -1,2-Dichloroethene	V	L	1.5E+04		1.5E+04	4.1E+04		4.1E+04
2,4-Dichlorophenol	NV	S						
1,2-Dichloropropane	V	L	2.4E+02	2.4E+02	8.3E+02	8.2E+02	8.2E+02	2.3E+03
1,3-Dichloropropene	V	L	1.5E+02	1.5E+02	4.2E+03	5.1E+02	5.1E+02	1.2E+04
Dieldrin	NV	S						
Diethyl phthalate	NV	S						
Dimethyl phthalate	NV	S						
2,4-Dimethylphenol	V	S						
2,4-Dinitrophenol	NV	S						
2,4-Dinitrotoluene	NV	S						
1,4-Dioxane	NV	L						
Dioxin (2,3,7,8-TCDD)	NV	S						
Endosulfan	NV	S						
Endrin	NV	S						
Ethylbenzene	V	L	9.8E+02	9.8E+02	2.1E+05	3.3E+03	3.3E+03	5.8E+05
Fluoranthene	NV	S						
Fluorene	V	S	2.9E+04		2.9E+04	8.2E+04		8.2E+04
Heptachlor	NV	S						
Heptachlor epoxide	NV	S						
Hexachlorobenzene	NV	S						
Hexachlorobutadiene	NV	S						
γ -Hexachlorocyclohexane (Lindane)	NV	S						
Hexachloroethane	NV	S						
Indeno(1,2,3-c,d)pyrene	NV	S						

**Lookup Table C-2. Shallow Soil Gas Protection Values
for Evaluation of Potential Vapor Intrusion Concerns
(volatile chemicals only)**

Chemical	Physical State		Unrestricted Use Exposure			Commercial/Industrial Land Use		
			Lowest Residential	Carcinogenic Effects	Noncarcinogenic Effects	Lowest C/I	Carcinogenic Effects	Noncarcinogenic Effects
			($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)
Lead	NV	S						
Mercury (elemental)	V	S	1.9E+01		1.9E+01	5.3E+01		5.3E+01
Methoxychlor	NV	S						
Methylene chloride	V	L	5.2E+03	5.2E+03	8.3E+04	1.7E+04	1.7E+04	2.3E+05
Methyl ethyl ketone	V	L	1.0E+06		1.0E+06	2.9E+06		2.9E+06
Methyl isobutyl ketone	V	L	6.3E+05		6.3E+05	1.8E+06		1.8E+06
Methyl mercury	NV	S						
2-Methylnaphthalene	V	S						
<i>tert</i> -Butyl methyl ether	V	L	9.4E+03	9.4E+03	6.3E+05	3.1E+04	3.1E+04	1.8E+06
Molybdenum	NV	S						
Naphthalene	V	S	7.2E+01	7.2E+01	6.3E+02	2.4E+02	2.4E+02	1.8E+03
Nickel	NV	S						
Pentachlorophenol	NV	S						
Perchlorate	NV	S						
Phenanthrene	V	S	2.2E+04		2.2E+04	6.1E+04		6.1E+04
Phenol	NV	S						
Polychlorinated biphenyls (PCBs)	NV	S						
Pyrene	V	S	2.2E+04		2.2E+04	6.1E+04		6.1E+04
Selenium	NV	S						
Silver	NV	S						
Styrene	V	L	1.9E+05		1.9E+05	5.3E+05		5.3E+05
<i>tert</i> -Butyl alcohol	V	L						
1,1,1,2-Tetrachloroethane	V	L	3.2E+02	3.2E+02		1.1E+03	1.1E+03	
1,1,2,2-Tetrachloroethane	V	L	4.2E+01	4.2E+01	4.4E+04	1.4E+02	1.4E+02	1.2E+05
Tetrachloroethene	V	L	4.1E+02	4.1E+02	8.3E+04	1.4E+03	1.4E+03	2.3E+05
Thallium	NV	S						

**Lookup Table C-2. Shallow Soil Gas Protection Values
for Evaluation of Potential Vapor Intrusion Concerns
(volatile chemicals only)**

Chemical	Physical State		Unrestricted Use Exposure			Commercial/Industrial Land Use		
			Lowest Residential	Carcinogenic Effects	Noncarcinogenic Effects	Lowest C/I	Carcinogenic Effects	Noncarcinogenic Effects
			($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)
Toluene	V	L	6.3E+04		6.3E+04	1.8E+05		1.8E+05
Toxaphene	NV	S						
TPH (gasolines)	V	L	1.0E+04		1.0E+04	2.9E+04		2.9E+04
TPH (middle distillates)	V	L	1.0E+04		1.0E+04	2.9E+04		2.9E+04
TPH (residual fuels)	NV	L/S						
1,2,4-Trichlorobenzene	V	L	8.3E+02		8.3E+02	2.3E+03		2.3E+03
1,1,1-Trichloroethane	V	L	4.6E+05		4.6E+05	1.3E+06		1.3E+06
1,1,2-Trichloroethane	V	L	1.5E+02	1.5E+02	2.9E+03	5.1E+02	5.1E+02	8.2E+03
Trichloroethene	V	L	1.2E+03	1.2E+03	1.3E+05	4.1E+03	4.1E+03	3.5E+05
2,4,5-Trichlorophenol	V	S	7.3E+04		7.3E+04	2.0E+05		2.0E+05
2,4,6-Trichlorophenol	NV	S						
Vanadium	NV	S						
Vinyl chloride	V	G	3.1E+01	3.1E+01	2.1E+04	1.0E+02	1.0E+02	5.8E+04
Xylenes	V	L	2.1E+04		2.1E+04	5.8E+04		5.8E+04
Zinc	NV	S						

Notes:

Soil gas levels intended to be protective of indoor air quality, calculated for volatile chemicals only.

Physical state of chemical at ambient conditions (V - volatile, NV - nonvolatile, S - solid, L - liquid, G - gas).

Chemical considered to be volatile if Henry's Law constant ($\text{atm m}^3/\text{mole}$) $>10^{-5}$ and molecular weight <200 (see Table E-1).

Dibromochloromethane, dibromochloropropane and pyrene considered volatile for purposes of modeling (USEPA 2004).

Target cancer risk = $1\text{E}-06$, Target Hazard Quotient = 0.2 for all chemicals.

Unrestricted soil gas:indoor air attenuation factor = 0.001 (1/1000). Commercial/industrial soil gas:indoor air attenuation factor = 0.0005 (1/2000).

Soil gas level for ethanol based on potential indoor air nuisance concerns (refer to Section 5.3.3 and Table H series).

soils or limited soil impacts and no groundwater source of VOCs.

**Lookup Table C-3. Ambient and Indoor Air Protection Values
(volatile chemicals only)**

Chemical	Physical State		Unit Risk	Reference	¹ Unrestricted Use Exposure			Commercial/Industrial Exposure			50% Odor Recognition Threshold (Table F-2) (µg/m ³)
	V	L	URF (ug/m ³) ⁻¹	RfC (µg/m ³)	Lowest Residential (µg/m ³)	Carcinogens (µg/m ³)	Noncarcinogens (µg/m ³)	C/I (µg/m ³)	Carcinogens (µg/m ³)	Non-carcinogens (µg/m ³)	
Chlorobenzene	V	L		1.0E+03	2.1E+02		2.1E+02	2.9E+02		2.9E+02	1.0E+03
Chloroethane	V	G		1.0E+02	2.1E+01		2.1E+01	2.9E+01		2.9E+01	3.8E+05
Chloroform	V	L	5.3E-06	3.0E+02	4.6E-01	4.6E-01	6.3E+01	7.7E-01	7.7E-01	8.8E+01	4.2E+05
Chloromethane	V	G		9.0E+01	1.9E+01		1.9E+01	2.6E+01		2.6E+01	-
2-Chlorophenol	V	L		1.8E+01	3.7E+00		3.7E+00	5.1E+00		5.1E+00	1.9E+01
Chromium (total)	NV	S									-
Chromium III	NV	S									-
Chromium VI	NV	S									-
Chrysene	NV	S									-
Cobalt	NV	S									-
Copper	NV	S									-
Cyanide	NV	S		7.0E+01	1.5E+01		1.5E+01	2.0E+01		2.0E+01	6.5E+02
Dibenz(a,h)anthracene	NV	S									-
Dibromochloromethane	V	S									-
1,2-dibromo-3-chloropropane	V	L	1.9E-03	2.0E-01	1.3E-03	1.3E-03	4.2E-02	2.2E-03	2.2E-03	5.8E-02	-
1,2-Dibromoethane	V	S	6.0E-04	9.0E+00	4.1E-03	4.1E-03	1.9E+00	6.8E-03	6.8E-03	2.6E+00	2.0E+05
1,2-Dichlorobenzene	V	L		2.0E+02	4.2E+01		4.2E+01	5.8E+01		5.8E+01	3.1E+05
1,3-Dichlorobenzene	V	L		1.1E+02	2.2E+01		2.2E+01	3.1E+01		3.1E+01	-
1,4-Dichlorobenzene	V	S	1.1E-05	8.0E+02	2.2E-01	2.2E-01	1.7E+02	3.7E-01	3.7E-01	2.3E+02	1.1E+03
3,3-Dichlorobenzidine	NV	S									-
Dichlorodiphenyldichloroethane (DDD)	NV	S									-
Dichlorodiphenyldichloroethene (DDE)	NV	S									-
Dichlorodiphenyltrichloroethane (DDT)	NV	S									-
1,1-Dichloroethane	V	L	1.6E-06	5.0E+02	1.5E+00	1.5E+00	1.0E+02	2.6E+00	2.6E+00	1.5E+02	1.3E+05
1,2-Dichloroethane	V	L	2.6E-05	4.9E+00	9.4E-02	9.4E-02	1.0E+00	1.6E-01	1.6E-01	1.4E+00	2.4E+03
1,1-Dichloroethene	V	L		2.0E+02	4.2E+01		4.2E+01	5.8E+01		5.8E+01	2.0E+06
cis-1,2-Dichloroethene	V	L		3.5E+01	7.3E+00		7.3E+00	1.0E+01		1.0E+01	-

**Lookup Table C-3. Ambient and Indoor Air Protection Values
(volatile chemicals only)**

Chemical	Physical State		Unit Risk	Reference	¹ Unrestricted Use Exposure			Commercial/Industrial Exposure			50% Odor Recognition Threshold (Table F-2) ($\mu\text{g}/\text{m}^3$)
	V	L	URF ($\mu\text{g}/\text{m}^3$) ⁻¹	RfC ($\mu\text{g}/\text{m}^3$)	Lowest Residential ($\mu\text{g}/\text{m}^3$)	Carcinogens ($\mu\text{g}/\text{m}^3$)	Noncarcinogens ($\mu\text{g}/\text{m}^3$)	C/I ($\mu\text{g}/\text{m}^3$)	Carcinogens ($\mu\text{g}/\text{m}^3$)	Non-carcinogens ($\mu\text{g}/\text{m}^3$)	
Methylene chloride	V	L	4.7E-07	4.0E+02	5.2E+00	5.2E+00	8.3E+01	8.7E+00	8.7E+00	1.2E+02	5.6E+05
Methyl ethyl ketone	V	L		5.0E+03	1.0E+03		1.0E+03	1.5E+03		1.5E+03	3.2E+04
Methyl isobutyl ketone	V	L		3.0E+03	6.3E+02		6.3E+02	8.8E+02		8.8E+02	4.2E+02
Methyl mercury	NV	S									-
2-Methylnaphthalene	V	S									6.8E+01
<i>tert</i> -Butyl methyl ether	V	L	2.6E-07	3.0E+03	9.4E+00	9.4E+00	6.3E+02	1.6E+01	1.6E+01	8.8E+02	5.3E+02
Molybdenum	NV	S									-
Naphthalene	V	S	3.4E-05	3.0E+00	7.2E-02	7.2E-02	6.3E-01	1.2E-01	1.2E-01	8.8E-01	4.4E+02
Nickel	NV	S									-
Pentachlorophenol	NV	S									-
Perchlorate	NV	S									-
Phenanthrene	V	S		1.1E+02	2.2E+01		2.2E+01	3.1E+01		3.1E+01	5.5E+01
Phenol	NV	S									1.6E+02
Polychlorinated biphenyls (PCBs)	NV	S									-
Pyrene	V	S		1.1E+02	2.2E+01		2.2E+01	3.1E+01		3.1E+01	-
Selenium	NV	S									-
Silver	NV	S									-
Styrene	V	L		9.0E+02	1.9E+02		1.9E+02	2.6E+02		2.6E+02	1.4E+03
<i>tert</i> -Butyl alcohol	V	L									-
1,1,1,2-Tetrachloroethane	V	L	7.6E-06		3.2E-01	3.2E-01		5.4E-01	5.4E-01		-
1,1,2,2-Tetrachloroethane	V	L	5.8E-05	2.1E+02	4.2E-02	4.2E-02	4.4E+01	7.0E-02	7.0E-02	6.1E+01	1.0E+04
Tetrachloroethene	V	L	5.9E-06	4.0E+02	4.1E-01	4.1E-01	8.3E+01	6.9E-01	6.9E-01	1.2E+02	3.2E+04
Thallium	NV	S									-
Toluene	V	L		3.0E+02	6.3E+01		6.3E+01	8.8E+01		8.8E+01	3.0E+04
Toxaphene	NV	S									-
TPH (gasolines)	V	L		4.9E+01	1.0E+01		1.0E+01	1.4E+01		1.4E+01	1.0E+02
TPH (middle distillates)	V	L		4.9E+01	1.0E+01		1.0E+01	1.4E+01		1.4E+01	1.0E+03

**Lookup Table C-3. Ambient and Indoor Air Protection Values
(volatile chemicals only)**

Chemical	Physical State		Unit Risk	Reference	¹ Unrestricted Use Exposure			Commercial/Industrial Exposure			50% Odor Recognition Threshold (Table F-2) (µg/m ³)
	URF (ug/m ³) ¹	RfC (µg/m ³)	Lowest Residential (µg/m ³)	Carcinogens (µg/m ³)	Noncarcinogens (µg/m ³)	C/I (µg/m ³)	Carcinogens (µg/m ³)	Non-carcinogens (µg/m ³)			
TPH (residual fuels)	NV	L/S									-
1,2,4-Trichlorobenzene	V	L		4.0E+00	8.3E-01		8.3E-01	1.2E+00		1.2E+00	2.2E+04
1,1,1-Trichloroethane	V	L		2.2E+03	4.6E+02		4.6E+02	6.4E+02		6.4E+02	6.5E+04
1,1,2-Trichloroethane	V	L	1.6E-05	1.4E+01	1.5E-01	1.5E-01	2.9E+00	2.6E-01	2.6E-01	4.1E+00	-
Trichloroethene	V	L	2.0E-06	6.0E+02	1.2E+00	1.2E+00	1.3E+02	2.0E+00	2.0E+00	1.8E+02	1.4E+06
2,4,5-Trichlorophenol	V	S		3.5E+02	7.3E+01		7.3E+01	1.0E+02		1.0E+02	-
2,4,6-Trichlorophenol	NV	S									3.0E-01
Vanadium	NV	S									-
Vinyl chloride	V	G	7.8E-05	1.0E+02	3.1E-02	3.1E-02	2.1E+01	5.2E-02	5.2E-02	2.9E+01	7.7E+05
Xylenes	V	L		1.0E+02	2.1E+01		2.1E+01	2.9E+01		2.9E+01	4.4E+02
Zinc	NV	S									-

Notes:

1. Unrestricted Use protection values generally considered adequate for other sensitive uses.

Target cancer risk = 1E-06, Target Hazard Quotient = 0.2 for all chemicals.

Physical state of chemical at ambient conditions (V - volatile, NV - nonvolatile, S - solid, L - liquid, G - gas).

Chemical considered to be volatile if Henry's Law constant (atm m³/mole) >10⁻⁵ and molecular weight <200 (see Table E-1).

Dibromochloromethane, dibromochloropropane and pyrene considered volatile for purposes of modeling (USEPA 2004).

Calculated based on spreadsheet provided with *User's Guide for the Johnson and Ettinger Indoor Air model (1991) for Subsurface Vapor Intrusion Into Buildings* (USEPA 2003) using default input parameter values.

Indoor air protection values listed only for volatile chemicals included in database of referenced model spreadsheet (plus MtBE).

50% Odor Recognition Thresholds from Massachusetts Department of Environmental Protection (MADEP, 1994) and ATSDR; included for reference (potential nuisance concerns, see Table H series).

**Lookup Table C-4 Shallow Soil Gas Protection Values
for Evaluation of Potential Vapor Intrusion Concerns using DTSC Attenuation Factors
(volatile chemicals only)**

Chemical	Physical State		² Unrestricted Use Exposure			Commercial/Industrial Land Use		
			Lowest Unrestricted	Carcinogenic Effects	Noncarcinogenic Effects	Lowest C/I	Carcinogenic Effects	Noncarcinogenic Effects
			(µg/m ³)	(µg/m ³)	(µg/m ³)	(µg/m ³)	(µg/m ³)	(µg/m ³)
Acenaphthene	V	S	2.2E+04		2.2E+04	6.1E+04		6.1E+04
Acenaphthylene	V	S	1.1E+04		1.1E+04	3.1E+04		3.1E+04
Acetone	V	L	3.3E+05		3.3E+05	9.2E+05		9.2E+05
Aldrin	NV	S						
Anthracene	V	S	1.1E+05		1.1E+05	3.1E+05		3.1E+05
Antimony	NV	S						
Arsenic	NV	S						
Barium	NV	S						
Benzene	V	L	4.2E+01	4.2E+01	3.1E+03	1.4E+02	1.4E+02	8.8E+03
Benzo(a)anthracene	NV	S						
Benzo(b)fluoranthene	NV	S						
Benzo(k)fluoranthene	NV	S						
Benzo(g,h,i)perylene	NV	S						
Benzo(a)pyrene	NV	S						
Beryllium	NV	S						
1,1-Biphenyl	V	S						
Bis(2-chloroethyl) ether	V	L	3.7E+00	3.7E+00		1.2E+01	1.2E+01	
Bis(2-chloroisopropyl) ether	V	L	1.7E+00	1.7E+00	1.5E+04	5.8E+00	5.8E+00	4.1E+04
Bis(2-ethylhexyl) phthalate	NV	S						
Boron	NV	S						
Bromodichloromethane	V	L	6.9E+01	6.9E+01	7.3E+03	2.3E+02	2.3E+02	2.0E+04
Bromoform (Tribromomethane)	NV	S						
Bromomethane	V	G	5.2E+02		5.2E+02	1.5E+03		1.5E+03
Cadmium	NV	S						
Carbon tetrachloride	V	L	9.4E+00	9.4E+00	4.2E+03	3.1E+01	3.1E+01	1.2E+04
Chlordane	NV	S						

**Lookup Table C-4 Shallow Soil Gas Protection Values
for Evaluation of Potential Vapor Intrusion Concerns using DTSC Attenuation Factors
(volatile chemicals only)**

Chemical	Physical State		² Unrestricted Use Exposure			Commercial/Industrial Land Use		
			Lowest Unrestricted	Carcinogenic Effects	Noncarcinogenic Effects	Lowest C/I	Carcinogenic Effects	Noncarcinogenic Effects
			($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)
p-Chloroaniline	NV	S						
Chlorobenzene	V	L	1.0E+05		1.0E+05	2.9E+05		2.9E+05
Chloroethane	V	G	1.0E+04		1.0E+04	2.9E+04		2.9E+04
Chloroform	V	L	2.3E+02	2.3E+02	3.1E+04	7.7E+02	7.7E+02	8.8E+04
Chloromethane	V	G	9.4E+03		9.4E+03	2.6E+04		2.6E+04
2-Chlorophenol	V	L	1.8E+03		1.8E+03	5.1E+03		5.1E+03
Chromium (total)	NV	S						
Chromium III	NV	S						
Chromium VI	NV	S						
Chrysene	NV	S						
Cobalt	NV	S						
Copper	NV	S						
Cyanide	NV	S	7.3E+03		7.3E+03	2.0E+04		2.0E+04
Dibenz(a,h)anthracene	NV	S						
Dibromochloromethane	V	S						
1,2-dibromo-3-chloropropane	V	L	6.4E-01	6.4E-01	2.1E+01	2.2E+00	2.2E+00	5.8E+01
1,2-Dibromoethane	V	S	2.0E+00	2.0E+00	9.4E+02	6.8E+00	6.8E+00	2.6E+03
1,2-Dichlorobenzene	V	L	2.1E+04		2.1E+04	5.8E+04		5.8E+04
1,3-Dichlorobenzene	V	L	1.1E+04		1.1E+04	3.1E+04		3.1E+04
1,4-Dichlorobenzene	V	S	1.1E+02	1.1E+02	8.3E+04	3.7E+02	3.7E+02	2.3E+05
3,3-Dichlorobenzidine	NV	S						
Dichlorodipenyldichloroethane (DDD)	NV	S						
Dichlorodipenyldichloroethene (DDE)	NV	S						
Dichlorodipenyiltrichloroethane (DDT)	NV	S						
1,1-Dichloroethane	V	L	7.6E+02	7.6E+02	5.2E+04	2.6E+03	2.6E+03	1.5E+05
1,2-Dichloroethane	V	L	4.7E+01	4.7E+01	5.1E+02	1.6E+02	1.6E+02	1.4E+03

**Lookup Table C-4 Shallow Soil Gas Protection Values
for Evaluation of Potential Vapor Intrusion Concerns using DTSC Attenuation Factors
(volatile chemicals only)**

Chemical	Physical State		² Unrestricted Use Exposure			Commercial/Industrial Land Use		
			Lowest Unrestricted	Carcinogenic Effects	Noncarcinogenic Effects	Lowest C/I	Carcinogenic Effects	Noncarcinogenic Effects
			(µg/m ³)	(µg/m ³)	(µg/m ³)	(µg/m ³)	(µg/m ³)	(µg/m ³)
1,1-Dichloroethene	V	L	2.1E+04		2.1E+04	5.8E+04		5.8E+04
<i>cis</i> -1,2-Dichloroethene	V	L	3.7E+03		3.7E+03	1.0E+04		1.0E+04
<i>trans</i> -1,2-Dichloroethene	V	L	7.3E+03		7.3E+03	2.0E+04		2.0E+04
2,4-Dichlorophenol	NV	S						
1,2-Dichloropropane	V	L	1.2E+02	1.2E+02	4.2E+02	4.1E+02	4.1E+02	1.2E+03
1,3-Dichloropropene	V	L	7.6E+01	7.6E+01	2.1E+03	2.6E+02	2.6E+02	5.8E+03
Dieldrin	NV	S						
Diethyl phthalate	NV	S						
Dimethyl phthalate	NV	S						
2,4-Dimethylphenol	V	S						
2,4-Dinitrophenol	NV	S						
2,4-Dinitrotoluene	NV	S						
1,4-Dioxane	NV	L						
Dioxin (2,3,7,8-TCDD)	NV	S						
Endosulfan	NV	S						
Endrin	NV	S						
Ethylbenzene	V	L	4.9E+02	4.9E+02	1.0E+05	1.6E+03	1.6E+03	2.9E+05
Fluoranthene	NV	S						
Fluorene	V	S	1.5E+04		1.5E+04	4.1E+04		4.1E+04
Heptachlor	NV	S						
Heptachlor epoxide	NV	S						
Hexachlorobenzene	NV	S						
Hexachlorobutadiene	NV	S						
γ-Hexachlorocyclohexane (Lindane)	NV	S						
Hexachloroethane	NV	S						
Indeno(1,2,3-c,d)pyrene	NV	S						

**Lookup Table C-4 Shallow Soil Gas Protection Values
for Evaluation of Potential Vapor Intrusion Concerns using DTSC Attenuation Factors
(volatile chemicals only)**

Chemical	Physical State		² Unrestricted Use Exposure			Commercial/Industrial Land Use		
			Lowest Unrestricted	Carcinogenic Effects	Noncarcinogenic Effects	Lowest C/I	Carcinogenic Effects	Noncarcinogenic Effects
			($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)
Lead	NV	S						
Mercury (elemental)	V	S	9.4E+00		9.4E+00	2.6E+01		2.6E+01
Methoxychlor	NV	S						
Methylene chloride	V	L	2.6E+03	2.6E+03	4.2E+04	8.7E+03	8.7E+03	1.2E+05
Methyl ethyl ketone	V	L	5.2E+05		5.2E+05	1.5E+06		1.5E+06
Methyl isobutyl ketone	V	L	3.1E+05		3.1E+05	8.8E+05		8.8E+05
Methyl mercury	NV	S						
2-Methylnaphthalene	V	S						
<i>tert</i> -Butyl methyl ether	V	L	4.7E+03	4.7E+03	3.1E+05	1.6E+04	1.6E+04	8.8E+05
Molybdenum	NV	S						
Naphthalene	V	S	3.6E+01	3.6E+01	3.1E+02	1.2E+02	1.2E+02	8.8E+02
Nickel	NV	S						
Pentachlorophenol	NV	S						
Perchlorate	NV	S						
Phenanthrene	V	S	1.1E+04		1.1E+04	3.1E+04		3.1E+04
Phenol	NV	S						
Polychlorinated biphenyls (PCBs)	NV	S						
Pyrene	V	S	1.1E+04		1.1E+04	3.1E+04		3.1E+04
Selenium	NV	S						
Silver	NV	S						
Styrene	V	L	9.4E+04		9.4E+04	2.6E+05		2.6E+05
<i>tert</i> -Butyl alcohol	V	L						
1,1,1,2-Tetrachloroethane	V	L	1.6E+02	1.6E+02		5.4E+02	5.4E+02	
1,1,2,2-Tetrachloroethane	V	L	2.1E+01	2.1E+01	2.2E+04	7.0E+01	7.0E+01	6.1E+04
Tetrachloroethene	V	L	2.1E+02	2.1E+02	4.2E+04	6.9E+02	6.9E+02	1.2E+05
Thallium	NV	S						

**Lookup Table C-4 Shallow Soil Gas Protection Values
for Evaluation of Potential Vapor Intrusion Concerns using DTSC Attenuation Factors
(volatile chemicals only)**

Chemical	Physical State		² Unrestricted Use Exposure			Commercial/Industrial Land Use		
			Lowest Unrestricted	Carcinogenic Effects	Noncarcinogenic Effects	Lowest C/I	Carcinogenic Effects	Noncarcinogenic Effects
			($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)
Toluene	V	L	3.1E+04		3.1E+04	8.8E+04		8.8E+04
Toxaphene	NV	S						
TPH (gasolines)	V	L	5.1E+03		5.1E+03	1.4E+04		1.4E+04
TPH (middle distillates)	V	L	5.1E+03		5.1E+03	1.4E+04		1.4E+04
TPH (residual fuels)	NV	L/S						
1,2,4-Trichlorobenzene	V	L	4.2E+02		4.2E+02	1.2E+03		1.2E+03
1,1,1-Trichloroethane	V	L	2.3E+05		2.3E+05	6.4E+05		6.4E+05
1,1,2-Trichloroethane	V	L	7.6E+01	7.6E+01	1.5E+03	2.6E+02	2.6E+02	4.1E+03
Trichloroethene	V	L	6.1E+02	6.1E+02	6.3E+04	2.0E+03	2.0E+03	1.8E+05
2,4,5-Trichlorophenol	V	S	3.7E+04		3.7E+04	1.0E+05		1.0E+05
2,4,6-Trichlorophenol	NV	S						
Vanadium	NV	S						
Vinyl chloride	V	G	1.6E+01	1.6E+01	1.0E+04	5.2E+01	5.2E+01	2.9E+04
Xylenes	V	L	1.0E+04		1.0E+04	2.9E+04		2.9E+04
Zinc	NV	S						

Notes:

2. Unrestricted Use protection values generally considered adequate for other sensitive uses.

Soil gas protection values intended to be protective of indoor air quality, calculated for volatile chemicals only.

Physical state of chemical at ambient conditions (V - volatile, NV - nonvolatile, S - solid, L - liquid, G - gas).

Chemical considered to be volatile if Henry's Law constant ($\text{atm m}^3/\text{mole}$) $>10^{-5}$ and molecular weight <200 (see Table E-1).

Dibromochloromethane, dibromochloropropane and pyrene considered volatile for purposes of modeling (USEPA 2004).

Target cancer risk = $1\text{E}-06$, Target Hazard Quotient = 0.2 for all chemicals.

Unrestricted Use soil gas:indoor air attenuation factor = 0.001 (1/1000). Commercial/industrial soil gas:indoor air attenuation factor = 0.0005 (1/2000).

**Lookup Table D-1. Groundwater Protection Values
(µg/L)**

Chemical	¹ Final Groundwater protection value	Basis	Ceiling Value (Taste & Odors, etc.)	Drinking Water (Toxicity)	Vapor Intrusion Into Buildings	Aquatic Habitat Goal (Chronic)
			Table G-1	Table D-3	Table C-1	Table F-4a
Acenaphthene	2.0E+01	Ceiling Value	2.0E+01	4.2E+02	4.2E+03	2.3E+01
Acenaphthylene	3.0E+01	Aquatic Habitat Goal	2.0E+03	2.1E+02	(Use soil gas)	3.0E+01
Acetone	1.5E+03	Aquatic Habitat Goal	2.0E+04	6.3E+03	5.3E+07	1.5E+03
Aldrin	2.0E-03	Drinking Water Toxicity	8.5E+00	2.0E-03		1.3E-01
Anthracene	7.3E-01	Aquatic Habitat Goal	2.2E+01	2.1E+03	4.3E+01	7.3E-01
Antimony	6.0E+00	Drinking Water Toxicity	5.0E+04	6.0E+00		3.0E+01
Arsenic	3.6E+01	Aquatic Habitat Goal	5.0E+04	5.0E+01		3.6E+01
Barium	1.0E+03	Drinking Water Toxicity	5.0E+04	1.0E+03		1.0E+03
Benzene	1.0E+00	Drinking Water Toxicity	1.7E+02	1.0E+00	5.4E+02	4.6E+01
Benzo(a)anthracene	2.7E-02	Aquatic Habitat Goal	5.0E+00	2.9E-02		2.7E-02
Benzo(b)fluoranthene	2.9E-02	Aquatic Habitat Goal	7.0E+00	2.9E-02		2.9E-02
Benzo(k)fluoranthene	2.9E-02	Drinking Water Toxicity	4.0E-01	2.9E-02		3.7E+00
Benzo(g,h,i)perylene	1.0E-01	Aquatic Habitat Goal	1.3E-01	2.1E+02		1.0E-01
Benzo(a)pyrene	1.4E-02	Aquatic Habitat Goal	1.9E+00	2.0E-01		1.4E-02
Beryllium	5.3E-01	Aquatic Habitat Goal	5.0E+04	4.0E+00		5.3E-01
1,1-Biphenyl	5.0E-01	Ceiling Value	5.0E-01	3.5E+02	(Use soil gas)	1.4E+01
Bis(2-chloroethyl) ether	3.2E-02	Drinking Water Toxicity	3.6E+02	3.2E-02	6.5E+01	1.2E+01
Bis(2-chloroisopropyl) ether	1.4E-02	Drinking Water Toxicity	3.2E+02	1.4E-02	(Use soil gas)	1.2E+01
Bis(2-ethylhexyl) phthalate	4.0E+00	Drinking Water Toxicity	6.5E+02	4.0E+00		3.2E+01
Boron	1.6E+00	Aquatic Habitat Goal	5.0E+04	1.0E+03		1.6E+00
Bromodichloromethane	1.0E+02	Drinking Water Toxicity	5.0E+04	1.0E+02	1.7E+02	1.1E+03
Bromoform (Tribromomethane)	1.0E+02	Drinking Water Toxicity	5.1E+02	1.0E+02		1.1E+03
Bromomethane	9.8E+00	Drinking Water Toxicity	5.0E+04	9.8E+00	5.8E+02	1.6E+02
Cadmium	2.5E-01	Aquatic Habitat Goal	5.0E+04	5.0E+00		2.5E-01
Carbon tetrachloride	5.0E-01	Drinking Water Toxicity	5.2E+02	5.0E-01	9.3E+00	9.8E+00
Chlordane	4.0E-03	Aquatic Habitat Goal	2.5E+00	1.0E-01		4.0E-03
p-Chloroaniline	5.0E+00	Aquatic Habitat Goal	5.0E+04	2.8E+01		5.0E+00
Chlorobenzene	2.5E+01	Aquatic Habitat Goal	5.0E+01	7.0E+01	1.3E+04	2.5E+01
Chloroethane	1.2E+01	Aquatic Habitat Goal	1.6E+01	1.2E+01	8.2E+02	1.2E+01
Chloroform	7.0E+01	Drinking Water Toxicity	2.4E+03	7.0E+01	3.3E+02	6.2E+02
Chloromethane	4.1E+01	Indoor Air Impacts	5.0E+04	1.8E+02	4.1E+01	1.1E+03
2-Chlorophenol	1.8E-01	Ceiling Value	1.8E-01	3.5E+01	5.3E+03	4.4E+02
Chromium (total)	5.0E+01	Drinking Water Toxicity	5.0E+04	5.0E+01		1.8E+02
Chromium III	1.8E+02	Aquatic Habitat Goal	5.0E+04	2.0E+05		1.8E+02
Chromium VI	1.1E+01	Aquatic Habitat Goal	5.0E+04	2.1E+01		1.1E+01
Chrysene	3.5E-01	Aquatic Habitat Goal	8.0E-01	4.8E+00	(Use soil gas)	3.5E-01

**Lookup Table D-1. Groundwater Protection Values
(µg/L)**

Chemical	¹ Final Groundwater protection value	Basis	Ceiling Value (Taste & Odors, etc.)	Drinking Water (Toxicity)	Vapor Intrusion Into Buildings	Aquatic Habitat Goal (Chronic)
			Table G-1	Table D-3	Table C-1	Table F-4a
Cobalt	3.0E+00	Aquatic Habitat Goal	5.0E+04	1.4E+02		3.0E+00
Copper	3.1E+00	Aquatic Habitat Goal	1.0E+03	1.3E+03		3.1E+00
Cyanide	1.0E+00	Aquatic Habitat Goal	1.7E+02	1.5E+02	(Use soil gas)	1.0E+00
Dibenz(a,h)anthracene	4.8E-03	Drinking Water Toxicity	2.5E-01	4.8E-03		7.5E+00
Dibromochloromethane	1.0E+02	Drinking Water Toxicity	5.0E+04	1.0E+02	1.7E+02	1.1E+03
1,2-dibromo-3-chloropropane	2.0E-01	Aquatic Habitat Goal	1.0E+01	2.0E-01	(Use soil gas)	2.0E-01
1,2-Dibromoethane	5.0E-02	Drinking Water Toxicity	5.0E+04	5.0E-02	1.5E+02	1.4E+03
1,2-Dichlorobenzene	1.0E+01	Ceiling Value	1.0E+01	6.0E+02	7.7E+04	1.4E+01
1,3-Dichlorobenzene	6.5E+01	Aquatic Habitat Goal	5.0E+04	2.1E+02	(Use soil gas)	6.5E+01
1,4-Dichlorobenzene	5.0E+00	Ceiling Value	5.0E+00	5.0E+00	3.4E+02	1.5E+01
3,3-Dichlorobenzidine	2.9E-02	Drinking Water Toxicity	1.6E+03	2.9E-02		2.5E+02
Dichlorodiphenyldichloroethane (DDD)	1.0E-03	Aquatic Habitat Goal	8.0E+01	1.5E-01		1.0E-03
Dichlorodiphenyldichloroethene (DDE)	1.0E-03	Aquatic Habitat Goal	2.0E+01	1.0E-01		1.0E-03
Dichlorodiphenyltrichloroethane (DDT)	1.0E-03	Aquatic Habitat Goal	1.5E+00	1.0E-01		1.0E-03
1,1-Dichloroethane	5.0E+00	Drinking Water Toxicity	5.0E+04	5.0E+00	1.0E+03	4.7E+01
1,2-Dichloroethane	5.0E-01	Drinking Water Toxicity	7.0E+03	5.0E-01	2.0E+02	2.0E+03
1,1-Dichloroethene	6.0E+00	Drinking Water Toxicity	1.5E+03	6.0E+00	6.3E+03	2.5E+01
cis-1,2-Dichloroethene	6.0E+00	Drinking Water Toxicity	5.0E+04	6.0E+00	6.2E+03	5.9E+02
trans-1,2-Dichloroethene	1.0E+01	Drinking Water Toxicity	2.6E+02	1.0E+01	6.7E+03	5.9E+02
2,4-Dichlorophenol	3.0E-01	Ceiling Value	3.0E-01	2.1E+01		3.7E+01
1,2-Dichloropropane	5.0E+00	Drinking Water Toxicity	1.0E+01	5.0E+00	2.8E+02	1.5E+03
1,3-Dichloropropene	5.0E-01	Drinking Water Toxicity	5.0E+04	5.0E-01	5.3E+01	2.4E+01
Dieldrin	1.9E-03	Aquatic Habitat Goal	4.1E+01	2.2E-03		1.9E-03
Diethyl phthalate	1.5E+00	Aquatic Habitat Goal	5.0E+04	5.6E+03		1.5E+00
Dimethyl phthalate	1.5E+00	Aquatic Habitat Goal	5.0E+04	7.0E+04		1.5E+00
2,4-Dimethylphenol	1.0E+02	Drinking Water Toxicity	4.0E+02	1.0E+02	2.5E+06	1.1E+02
2,4-Dinitrophenol	1.5E+01	Aquatic Habitat Goal	5.0E+04	1.4E+02		1.5E+01
2,4-Dinitrotoluene	5.1E-02	Drinking Water Toxicity	5.0E+04	5.1E-02		1.2E+02
1,4-Dioxane	3.0E+00	Drinking Water Toxicity	5.0E+04	3.0E+00		3.4E+05
Dioxin (2,3,7,8-TCDD)	1.0E-06	Aquatic Habitat Goal	7.0E+03	3.0E-05		1.0E-06
Endosulfan	8.7E-03	Aquatic Habitat Goal	7.5E+01	4.2E+01		8.7E-03
Endrin	2.3E-03	Aquatic Habitat Goal	4.1E+01	2.0E+00		2.3E-03
Ethylbenzene	3.0E+01	Ceiling Value	3.0E+01	3.0E+02	1.7E+05	4.3E+01
Fluoranthene	8.0E+00	Aquatic Habitat Goal	1.3E+02	2.8E+02		8.0E+00
Fluorene	3.9E+00	Aquatic Habitat Goal	9.5E+02	2.8E+02	1.9E+03	3.9E+00
Heptachlor	3.6E-03	Aquatic Habitat Goal	2.0E+01	1.0E-02		3.6E-03

**Lookup Table D-1. Groundwater Protection Values
(µg/L)**

Chemical	¹ Final Groundwater protection value	Basis	Ceiling Value (Taste & Odors, etc.)	Drinking Water (Toxicity)	Vapor Intrusion Into Buildings	Aquatic Habitat Goal (Chronic)
			Table G-1	Table D-3	Table C-1	Table F-4a
Heptachlor epoxide	3.6E-03	Aquatic Habitat Goal	1.8E+02	1.0E-02		3.6E-03
Hexachlorobenzene	1.0E+00	Drinking Water Toxicity	5.5E+01	1.0E+00		3.7E+00
Hexachlorobutadiene	4.5E-01	Drinking Water Toxicity	6.0E+00	4.5E-01		9.3E-01
γ-Hexachlorocyclohexane (Lindane)	1.6E-02	Aquatic Habitat Goal	3.5E+03	2.0E-01		1.6E-02
Hexachloroethane	9.0E-01	Drinking Water Toxicity	1.0E+01	9.0E-01		1.2E+01
Indeno(1,2,3-c,d)pyrene	4.8E-02	Aquatic Habitat Goal	2.7E-01	4.8E-02		4.8E-02
Lead	2.5E+00	Aquatic Habitat Goal	5.0E+04	1.5E+01		2.5E+00
Mercury (elemental)	2.5E-02	Aquatic Habitat Goal	5.0E+04	2.0E+00	(Use soil gas)	2.5E-02
Methoxychlor	3.0E-03	Aquatic Habitat Goal	2.0E+01	4.0E+01		3.0E-03
Methylene chloride	5.0E+00	Drinking Water Toxicity	9.1E+03	5.0E+00	2.4E+03	2.2E+03
Methyl ethyl ketone	4.2E+03	Drinking Water Toxicity	8.4E+03	4.2E+03	2.4E+07	1.4E+04
Methyl isobutyl ketone	1.2E+02	Drinking Water Toxicity	1.3E+03	1.2E+02	3.0E+06	1.7E+02
Methyl mercury	3.0E-03	Aquatic Habitat Goal	5.0E+04	7.0E-01		3.0E-03
2-Methylnaphthalene	2.1E+00	Aquatic Habitat Goal	1.0E+01	2.8E+01	2.6E+04	2.1E+00
tert-Butyl methyl ether	5.0E+00	Ceiling Value	5.0E+00	1.3E+01	2.4E+04	8.0E+03
Molybdenum	3.5E+01	Drinking Water Toxicity	5.0E+04	3.5E+01		2.4E+02
Naphthalene	1.7E+01	Drinking Water Toxicity	2.1E+01	1.7E+01	3.2E+03	2.4E+01
Nickel	8.2E+00	Aquatic Habitat Goal	5.0E+04	1.0E+02		8.2E+00
Pentachlorophenol	1.0E+00	Drinking Water Toxicity	3.0E+01	1.0E+00		7.9E+00
Perchlorate	6.0E+00	Drinking Water Toxicity	5.0E+04	6.0E+00		6.0E+02
Phenanthrene	4.6E+00	Aquatic Habitat Goal	4.1E+02	2.1E+02	(Use soil gas)	4.6E+00
Phenol	5.0E+00	Ceiling Value	5.0E+00	4.2E+03		2.6E+02
Polychlorinated biphenyls (PCBs)	1.4E-02	Aquatic Habitat Goal	1.6E+01	5.0E-01		1.4E-02
Pyrene	2.0E+00	Aquatic Habitat Goal	6.8E+01	4.2E+02	1.4E+02	2.0E+00
Selenium	5.0E+00	Aquatic Habitat Goal	5.0E+04	5.0E+01		5.0E+00
Silver	1.9E-01	Aquatic Habitat Goal	1.0E+02	3.5E+01		1.9E-01
Styrene	1.0E+01	Ceiling Value	1.0E+01	1.0E+02	3.1E+05	1.0E+02
tert-Butyl alcohol	1.2E+01	Drinking Water Toxicity	5.0E+04	1.2E+01	(Use soil gas)	1.8E+04
1,1,1,2-Tetrachloroethane	1.3E+00	Drinking Water Toxicity	5.0E+04	1.3E+00	(Use soil gas)	9.3E+02
1,1,2,2-Tetrachloroethane	1.0E+00	Drinking Water Toxicity	5.0E+02	1.0E+00	1.9E+02	2.4E+02
Tetrachloroethene	5.0E+00	Drinking Water Toxicity	1.7E+02	5.0E+00	1.2E+02	1.2E+02
Thallium	2.0E+00	Drinking Water Toxicity	5.0E+04	2.0E+00		4.0E+00
Toluene	4.0E+01	Ceiling Value	4.0E+01	1.5E+02	3.8E+05	1.3E+02
Toxaphene	2.0E-04	Aquatic Habitat Goal	1.4E+02	3.0E+00		2.0E-04
TPH (gasolines)	1.0E+02	Ceiling Value	1.0E+02	2.1E+02	(Use soil gas)	2.1E+02
TPH (middle distillates)	1.0E+02	Ceiling Value	1.0E+02	2.1E+02	(Use soil gas)	2.1E+02

**Lookup Table D-1. Groundwater Protection Values
(µg/L)**

Chemical	¹ Final Groundwater protection value	Basis	Ceiling Value (Taste & Odors, etc.)	Drinking Water (Toxicity)	Vapor Intrusion Into Buildings	Aquatic Habitat Goal (Chronic)
			Table G-1	Table D-3	Table C-1	Table F-4a
TPH (residual fuels)	1.0E+02	Ceiling Value	1.0E+02	2.1E+02		2.1E+02
1,2,4-Trichlorobenzene	5.0E+00	Drinking Water Toxicity	3.0E+03	5.0E+00	2.5E+03	2.5E+01
1,1,1-Trichloroethane	6.2E+01	Aquatic Habitat Goal	9.7E+02	2.0E+02	1.3E+05	6.2E+01
1,1,2-Trichloroethane	5.0E+00	Drinking Water Toxicity	5.0E+04	5.0E+00	3.5E+02	9.4E+02
Trichloroethene	5.0E+00	Drinking Water Toxicity	3.1E+02	5.0E+00	5.3E+02	3.6E+02
2,4,5-Trichlorophenol	1.1E+01	Aquatic Habitat Goal	2.0E+02	7.0E+02	8.3E+05	1.1E+01
2,4,6-Trichlorophenol	7.0E-01	Drinking Water Toxicity	1.0E+02	7.0E-01		9.7E+01
Vanadium	1.5E+01	Drinking Water Toxicity	5.0E+04	1.5E+01		1.9E+01
Vinyl chloride	5.0E-01	Drinking Water Toxicity	3.4E+03	5.0E-01	3.8E+00	7.8E+02
Xylenes	2.0E+01	Ceiling Value	2.0E+01	1.8E+03	1.6E+05	1.0E+02
Zinc	8.1E+01	Aquatic Habitat Goal	5.0E+03	5.0E+03		8.1E+01

Notes:
1. Lowest of Ceiling Value, Drinking Water (toxicity) goal, Indoor-Air Impact goal and Aquatic Habitat Goal>Used to develop soil leaching levels for protection of groundwater quality.

TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.

sol - solubility threshold

Ceiling Level: Odor threshold, 1/2 solubility or 50000 µg/L maximum, whichever is lower. Intended to limit nuisances and general resource degradation.

Odor-thresholds assume no dilution.

Human Toxicity: Based on primary maximum concentration levels (MCLs), or equivalent. Considered protective of human health.

Indoor Air Impact: Addresses potential emission of volatile chemicals from groundwater and subsequent impact on indoor air. Value for permeable (e.g., sandy vadose-zone soils).

Aquatic Habitat Goal: Addresses potential discharge of groundwater to surface waterbody and subsequent impact on aquatic life; Potential dilution upon discharge to surface water not considered.

Method detection limits and background concentrations replace final protection value as appropriate.

All water associated with the Snake River Plain Aquifer is considered to be a drinking water source.

**Lookup Table D-2. Surface Water Protection Values
Fresh Water Habitats
(µg/L)**

	¹ Final Surface Water protection value	Basis	Ceiling Value (Taste & Odors, etc.)	Drinking Water (Toxicity)	Fresh Water Aquatic Habitat Goal (Chronic Toxicity)	Bioaccumulation and Human Consumption
Chemical			Table I-3	Table F-3	Table D-1	Table D-4
Acenaphthene	2.0E+01	Ceiling Value	2.0E+01	4.2E+02	2.3E+01	2.7E+03
Acenaphthylene	3.0E+01	Aquatic Habitat Chronic Toxicity	2.0E+03	2.1E+02	3.0E+01	
Acetone	1.5E+03	Aquatic Habitat Chronic Toxicity	2.0E+04	6.3E+03	1.5E+03	
Aldrin	1.4E-04	Bioaccumulation/Human Consumption	8.5E+00	2.0E-03	3.0E-01	1.4E-04
Anthracene	7.3E-01	Aquatic Habitat Chronic Toxicity	2.2E+01	2.1E+03	7.3E-01	1.1E+05
Antimony	6.0E+00	Drinking Water Toxicity	5.0E+04	6.0E+00	3.0E+01	4.3E+03
Arsenic	1.4E-01	Bioaccumulation/Human Consumption	5.0E+04	5.0E+01	1.5E+02	1.4E-01
Barium	1.0E+03	Drinking Water Toxicity	5.0E+04	1.0E+03	1.0E+03	
Benzene	1.0E+00	Drinking Water Toxicity	1.7E+02	1.0E+00	4.6E+01	7.1E+01
Benzo(a)anthracene	2.7E-02	Aquatic Habitat Chronic Toxicity	5.0E+00	2.9E-02	2.7E-02	4.9E-02
Benzo(b)fluoranthene	2.9E-02	Drinking Water Toxicity	7.0E+00	2.9E-02	2.9E-02	4.9E-02
Benzo(k)fluoranthene	2.9E-02	Drinking Water Toxicity	4.0E-01	2.9E-02	3.7E+00	4.9E-02
Benzo(g,h,i)perylene	1.0E-01	Aquatic Habitat Chronic Toxicity	1.3E-01	2.1E+02	1.0E-01	
Benzo(a)pyrene	1.4E-02	Aquatic Habitat Chronic Toxicity	1.9E+00	2.0E-01	1.4E-02	4.9E-02
Beryllium	2.7E+00	Aquatic Habitat Chronic Toxicity	5.0E+04	4.0E+00	2.7E+00	
1,1-Biphenyl	5.0E-01	Ceiling Value	5.0E-01	3.5E+02	1.4E+01	
Bis(2-chloroethyl) ether	3.2E-02	Drinking Water Toxicity	3.6E+02	3.2E-02	6.1E+01	1.4E+00
Bis(2-chloroisopropyl) ether	1.4E-02	Drinking Water Toxicity	3.2E+02	1.4E-02	6.1E+01	1.7E+05
Bis(2-ethylhexyl) phthalate	4.0E+00	Drinking Water Toxicity	6.5E+02	4.0E+00	3.2E+01	5.9E+00
Boron	1.6E+00	Aquatic Habitat Chronic Toxicity	5.0E+04	1.0E+03	1.6E+00	
Bromodichloromethane	1.0E+02	Drinking Water Toxicity	5.0E+04	1.0E+02	1.1E+03	
Bromoform (Tribromomethane)	1.0E+02	Drinking Water Toxicity	5.1E+02	1.0E+02	1.1E+03	3.6E+02
Bromomethane	9.8E+00	Drinking Water Toxicity	5.0E+04	9.8E+00	1.6E+02	4.0E+03
Cadmium	2.5E-01	Aquatic Habitat Chronic Toxicity	5.0E+04	5.0E+00	2.5E-01	
Carbon tetrachloride	5.0E-01	Drinking Water Toxicity	5.2E+02	5.0E-01	9.8E+00	4.4E+00
Chlordane	5.9E-04	Bioaccumulation/Human Consumption	2.5E+00	1.0E-01	4.3E-03	5.9E-04

**Lookup Table D-2. Surface Water Protection Values
Fresh Water Habitats
(µg/L)**

	¹ Final Surface Water protection value	Basis	Ceiling Value (Taste & Odors, etc.) Table I-3	Drinking Water (Toxicity) Table F-3	Fresh Water Aquatic Habitat Goal (Chronic Toxicity) Table D-1	Bioaccumulation and Human Consumption Table D-4
Chemical						
p-Chloroaniline	5.0E+00	Aquatic Habitat Chronic Toxicity	5.0E+04	2.8E+01	5.0E+00	
Chlorobenzene	2.5E+01	Aquatic Habitat Chronic Toxicity	5.0E+01	7.0E+01	2.5E+01	2.1E+04
Chloroethane	1.2E+01	Drinking Water Toxicity	1.6E+01	1.2E+01	1.2E+01	
Chloroform	7.0E+01	Drinking Water Toxicity	2.4E+03	7.0E+01	6.2E+02	4.7E+02
Chloromethane	1.8E+02	Drinking Water Toxicity	5.0E+04	1.8E+02	1.1E+03	
2-Chlorophenol	1.8E-01	Ceiling Value	1.8E-01	3.5E+01	4.4E+02	4.0E+02
Chromium (total)	5.0E+01	Drinking Water Toxicity	5.0E+04	5.0E+01	1.8E+02	
Chromium III	1.8E+02	Aquatic Habitat Chronic Toxicity	5.0E+04	2.0E+05	1.8E+02	
Chromium VI	1.1E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	2.1E+01	1.1E+01	
Chrysene	4.9E-02	Bioaccumulation/Human Consumption	8.0E-01	4.8E+00	3.5E-01	4.9E-02
Cobalt	3.0E+00	Aquatic Habitat Chronic Toxicity	5.0E+04	1.4E+02	3.0E+00	
Copper	9.0E+00	Aquatic Habitat Chronic Toxicity	1.0E+03	1.3E+03	9.0E+00	
Cyanide	5.2E+00	Aquatic Habitat Chronic Toxicity	1.7E+02	1.5E+02	5.2E+00	2.2E+05
Dibenz(a,h)anthracene	4.8E-03	Drinking Water Toxicity	2.5E-01	4.8E-03	7.5E+00	4.9E-02
Dibromochloromethane	4.6E+01	Bioaccumulation/Human Consumption	5.0E+04	1.0E+02	1.1E+03	4.6E+01
1,2-dibromo-3-chloropropane	2.0E-01	Drinking Water Toxicity	1.0E+01	2.0E-01	2.0E-01	
1,2-Dibromoethane	5.0E-02	Drinking Water Toxicity	5.0E+04	5.0E-02	1.4E+03	
1,2-Dichlorobenzene	1.0E+01	Ceiling Value	1.0E+01	6.0E+02	1.4E+01	1.7E+04
1,3-Dichlorobenzene	7.1E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	2.1E+02	7.1E+01	2.6E+03
1,4-Dichlorobenzene	5.0E+00	Ceiling Value, Drinking Water Toxicity	5.0E+00	5.0E+00	1.5E+01	2.6E+03
3,3-Dichlorobenzidine	2.9E-02	Drinking Water Toxicity	1.6E+03	2.9E-02	2.5E+02	7.7E-02
Dichlorodiphenyldichloroethane (DDD)	8.4E-04	Bioaccumulation/Human Consumption	8.0E+01	1.5E-01	1.0E-03	8.4E-04
Dichlorodiphenyldichloroethene (DDE)	5.9E-04	Bioaccumulation/Human Consumption	2.0E+01	1.0E-01	1.0E-03	5.9E-04
Dichlorodiphenyltrichloroethane (DDT)	5.9E-04	Bioaccumulation/Human Consumption	1.5E+00	1.0E-01	1.0E-03	5.9E-04
1,1-Dichloroethane	5.0E+00	Drinking Water Toxicity	5.0E+04	5.0E+00	4.7E+01	
1,2-Dichloroethane	5.0E-01	Drinking Water Toxicity	7.0E+03	5.0E-01	1.0E+04	9.9E+01

**Lookup Table D-2. Surface Water Protection Values
Fresh Water Habitats
(µg/L)**

	¹ Final Surface Water protection value	Basis	Ceiling Value (Taste & Odors, etc.)	Drinking Water (Toxicity)	Fresh Water Aquatic Habitat Goal (Chronic Toxicity)	Bioaccumulation and Human Consumption
Chemical			Table I-3	Table F-3	Table D-1	Table D-4
1,1-Dichloroethene	3.2E+00	Bioaccumulation/Human Consumption	1.5E+03	6.0E+00	2.5E+01	3.2E+00
<i>cis</i> -1,2-Dichloroethene	6.0E+00	Drinking Water Toxicity	5.0E+04	6.0E+00	5.9E+02	
<i>trans</i> -1,2-Dichloroethene	1.0E+01	Drinking Water Toxicity	2.6E+02	1.0E+01	5.9E+02	1.4E+05
2,4-Dichlorophenol	3.0E-01	Ceiling Value	3.0E-01	2.1E+01	1.8E+02	7.9E+02
1,2-Dichloropropane	5.0E+00	Drinking Water Toxicity	1.0E+01	5.0E+00	2.9E+03	3.9E+01
1,3-Dichloropropene	5.0E-01	Drinking Water Toxicity	5.0E+04	5.0E-01	1.2E+02	1.7E+03
Dieldrin	1.4E-04	Bioaccumulation/Human Consumption	4.1E+01	2.2E-03	5.6E-02	1.4E-04
Diethyl phthalate	1.5E+00	Aquatic Habitat Chronic Toxicity	5.0E+04	5.6E+03	1.5E+00	1.2E+54
Dimethyl phthalate	1.5E+00	Aquatic Habitat Chronic Toxicity	5.0E+04	7.0E+04	1.5E+00	2.9E+06
2,4-Dimethylphenol	1.0E+02	Drinking Water Toxicity	4.0E+02	1.0E+02	5.3E+02	2.3E+03
2,4-Dinitrophenol	7.5E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.4E+02	7.5E+01	1.4E+04
2,4-Dinitrotoluene	5.1E-02	Drinking Water Toxicity	5.0E+04	5.1E-02	1.2E+02	9.1E+00
1,4-Dioxane	3.0E+00	Drinking Water Toxicity	5.0E+04	3.0E+00	3.4E+05	
Dioxin (2,3,7,8-TCDD)	1.4E-08	Bioaccumulation/Human Consumption	7.0E+03	3.0E-05	5.0E-06	1.4E-08
Endosulfan	5.6E-02	Aquatic Habitat Chronic Toxicity	7.5E+01	4.2E+01	5.6E-02	2.4E+02
Endrin	3.6E-02	Aquatic Habitat Chronic Toxicity	4.1E+01	2.0E+00	3.6E-02	8.1E-01
Ethylbenzene	3.0E+01	Ceiling Value	3.0E+01	3.0E+02	2.9E+02	2.9E+04
Fluoranthene	8.1E+00	Aquatic Habitat Chronic Toxicity	1.3E+02	2.8E+02	8.1E+00	3.7E+02
Fluorene	3.9E+00	Aquatic Habitat Chronic Toxicity	9.5E+02	2.8E+02	3.9E+00	1.4E+04
Heptachlor	2.1E-04	Bioaccumulation/Human Consumption	2.0E+01	1.0E-02	3.8E-03	2.1E-04
Heptachlor epoxide	1.1E-04	Bioaccumulation/Human Consumption	1.8E+02	1.0E-02	3.8E-03	1.1E-04
Hexachlorobenzene	7.7E-04	Bioaccumulation/Human Consumption	5.5E+01	1.0E+00	3.7E+00	7.7E-04
Hexachlorobutadiene	4.5E-01	Drinking Water Toxicity	6.0E+00	4.5E-01	4.7E+00	5.0E+01
γ-Hexachlorocyclohexane (Lindane)	6.3E-02	Bioaccumulation/Human Consumption	3.5E+03	2.0E-01	8.0E-02	6.3E-02
Hexachloroethane	9.0E-01	Drinking Water Toxicity	1.0E+01	9.0E-01	1.2E+01	8.9E+00
Indeno(1,2,3-c,d)pyrene	4.8E-02	Drinking Water Toxicity	2.7E-01	4.8E-02	4.8E-02	4.9E-02

**Lookup Table D-2. Surface Water Protection Values
Fresh Water Habitats
(µg/L)**

	¹ Final Surface Water protection value	Basis	Ceiling Value (Taste & Odors, etc.) Table I-3	Drinking Water (Toxicity) Table F-3	Fresh Water Aquatic Habitat Goal (Chronic Toxicity) Table D-1	Bioaccumulation and Human Consumption Table D-4
Chemical						
Lead	2.5E+00	Aquatic Habitat Chronic Toxicity	5.0E+04	1.5E+01	2.5E+00	
Mercury (elemental)	2.5E-02	Aquatic Habitat Chronic Toxicity	5.0E+04	2.0E+00	2.5E-02	5.1E-02
Methoxychlor	1.9E-02	Aquatic Habitat Chronic Toxicity	2.0E+01	4.0E+01	1.9E-02	
Methylene chloride	5.0E+00	Drinking Water Toxicity	9.1E+03	5.0E+00	2.2E+03	1.6E+03
Methyl ethyl ketone	4.2E+03	Drinking Water Toxicity	8.4E+03	4.2E+03	1.4E+04	
Methyl isobutyl ketone	1.2E+02	Drinking Water Toxicity	1.3E+03	1.2E+02	1.7E+02	
Methyl mercury	3.0E-03	Aquatic Habitat Chronic Toxicity	5.0E+04	7.0E-01	3.0E-03	
2-Methylnaphthalene	2.1E+00	Aquatic Habitat Chronic Toxicity	1.0E+01	2.8E+01	2.1E+00	
<i>tert</i> -Butyl methyl ether	5.0E+00	Ceiling Value	5.0E+00	1.3E+01	6.6E+04	
Molybdenum	3.5E+01	Drinking Water Toxicity	5.0E+04	3.5E+01	2.4E+02	
Naphthalene	1.7E+01	Drinking Water Toxicity	2.1E+01	1.7E+01	2.4E+01	
Nickel	5.2E+01	Aquatic Habitat Chronic Toxicity	5.0E+04	1.0E+02	5.2E+01	4.6E+03
Pentachlorophenol	1.0E+00	Drinking Water Toxicity	3.0E+01	1.0E+00	1.5E+01	8.2E+00
Perchlorate	6.0E+00	Drinking Water Toxicity	5.0E+04	6.0E+00	6.0E+02	
Phenanthrene	6.3E+00	Aquatic Habitat Chronic Toxicity	4.1E+02	2.1E+02	6.3E+00	
Phenol	5.0E+00	Ceiling Value	5.0E+00	4.2E+03	1.3E+03	4.6E+06
Polychlorinated biphenyls (PCBs)	1.7E-04	Bioaccumulation/Human Consumption	1.6E+01	5.0E-01	1.4E-02	1.7E-04
Pyrene	2.0E+00	Aquatic Habitat Chronic Toxicity	6.8E+01	4.2E+02	2.0E+00	1.1E+04
Selenium	5.0E+00	Aquatic Habitat Chronic Toxicity	5.0E+04	5.0E+01	5.0E+00	
Silver	3.4E-01	Aquatic Habitat Chronic Toxicity	1.0E+02	3.5E+01	3.4E-01	
Styrene	1.0E+01	Ceiling Value	1.0E+01	1.0E+02	1.0E+02	
<i>tert</i> -Butyl alcohol	1.2E+01	Drinking Water Toxicity	5.0E+04	1.2E+01	1.8E+04	
1,1,1,2-Tetrachloroethane	1.3E+00	Drinking Water Toxicity	5.0E+04	1.3E+00	9.3E+02	
1,1,2,2-Tetrachloroethane	1.0E+00	Drinking Water Toxicity	5.0E+02	1.0E+00	4.2E+02	1.1E+01
Tetrachloroethene	5.0E+00	Drinking Water Toxicity	1.7E+02	5.0E+00	1.2E+02	8.9E+00
Thallium	2.0E+00	Drinking Water Toxicity	5.0E+04	2.0E+00	2.0E+01	6.3E+00

**Lookup Table D-2. Surface Water Protection Values
Fresh Water Habitats
(µg/L)**

	¹ Final Surface Water protection value	Basis	Ceiling Value (Taste & Odors, etc.)	Drinking Water (Toxicity)	Fresh Water Aquatic Habitat Goal (Chronic Toxicity)	Bioaccumulation and Human Consumption
Chemical			Table I-3	Table F-3	Table D-1	Table D-4
Toluene	4.0E+01	Ceiling Value	4.0E+01	1.5E+02	1.3E+02	2.0E+05
Toxaphene	2.0E-04	Aquatic Habitat Chronic Toxicity	1.4E+02	3.0E+00	2.0E-04	7.5E-04
TPH (gasolines)	1.0E+02	Ceiling Value	1.0E+02	2.1E+02	2.1E+02	
TPH (middle distillates)	1.0E+02	Ceiling Value	1.0E+02	2.1E+02	2.1E+02	
TPH (residual fuels)	1.0E+02	Ceiling Value	1.0E+02	2.1E+02	2.1E+02	
1,2,4-Trichlorobenzene	5.0E+00	Drinking Water Toxicity	3.0E+03	5.0E+00	2.5E+01	
1,1,1-Trichloroethane	6.2E+01	Aquatic Habitat Chronic Toxicity	9.7E+02	2.0E+02	6.2E+01	
1,1,2-Trichloroethane	5.0E+00	Drinking Water Toxicity	5.0E+04	5.0E+00	4.7E+03	4.2E+01
Trichloroethene	5.0E+00	Drinking Water Toxicity	3.1E+02	5.0E+00	3.6E+02	8.1E+01
2,4,5-Trichlorophenol	6.3E+01	Aquatic Habitat Chronic Toxicity	2.0E+02	7.0E+02	6.3E+01	3.6E+03
2,4,6-Trichlorophenol	7.0E-01	Drinking Water Toxicity	1.0E+02	7.0E-01	4.9E+02	6.5E+00
Vanadium	1.5E+01	Drinking Water Toxicity	5.0E+04	1.5E+01	1.9E+01	
Vinyl chloride	5.0E-01	Drinking Water Toxicity	3.4E+03	5.0E-01	7.8E+02	5.3E+02
Xylenes	2.0E+01	Ceiling Value	2.0E+01	1.8E+03	1.0E+02	
Zinc	1.2E+02	Aquatic Habitat Chronic Toxicity	5.0E+03	5.0E+03	1.2E+02	

Notes:

1. Lowest of ceiling value, drinking water goal, aquatic habitat goal, and bioaccumulation goal.

TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.

Ceiling Level: Odor threshold, 1/2 solubility or 50000 µg/L maximum, whichever is lower. Intended to limit nuisances and general resource degradation.

All water associated with the Snake River Plain Aquifer is considered to be a drinking water source.

**Lookup Table D-3. Summary of Drinking Water Protection Values
(µg/L)**

Chemical	Final Screening Level	Basis	Cal Primary MCL	Other Criteria	Reference	*Risk-Based Goals	Basis
Acenaphthene	4.2E+02	Noncarcinogenic Effects				4.2E+02	Noncarcinogenic Effects
Acenaphthylene	2.1E+02	Noncarcinogenic Effects				2.1E+02	Noncarcinogenic Effects
Acetone	6.3E+03	Noncarcinogenic Effects				6.3E+03	Noncarcinogenic Effects
Aldrin	2.0E-03	Cal DHS AL		2.0E-03	Cal DHS AL	2.1E-03	Carcinogenic Effects
Anthracene	2.1E+03	Noncarcinogenic Effects				2.1E+03	Noncarcinogenic Effects
Antimony	6.0E+00	Cal Primary MCL	6.0E+00	2.0E+01	Cal OEHHA PHG	2.8E+00	Noncarcinogenic Effects
Arsenic	5.0E+01	Cal Primary MCL	5.0E+01			2.3E-02	Carcinogenic Effects
Barium	1.0E+03	Cal Primary MCL	1.0E+03	2.0E+03	Cal OEHHA PHG	1.4E+03	Noncarcinogenic Effects
Benzene	1.0E+00	Cal Primary MCL	1.0E+00	1.5E-01	Cal OEHHA PHG	3.5E-01	Carcinogenic Effects
Benzo(a)anthracene	2.9E-02	Carcinogenic Effects				2.9E-02	Carcinogenic Effects
Benzo(b)fluoranthene	2.9E-02	Carcinogenic Effects				2.9E-02	Carcinogenic Effects
Benzo(k)fluoranthene	2.9E-02	Carcinogenic Effects				2.9E-02	Carcinogenic Effects
Benzo(g,h,i)perylene	2.1E+02	Noncarcinogenic Effects				2.1E+02	Noncarcinogenic Effects
Benzo(a)pyrene	2.0E-01	Cal Primary MCL	2.0E-01			2.9E-03	Carcinogenic Effects
Beryllium	4.0E+00	Cal Primary MCL	4.0E+00			1.4E+01	Noncarcinogenic Effects
1,1-Biphenyl	3.5E+02	Noncarcinogenic Effects				3.5E+02	Noncarcinogenic Effects
Bis(2-chloroethyl) ether	3.2E-02	Carcinogenic Effects				3.2E-02	Carcinogenic Effects
Bis(2-chloroisopropyl) ether	1.4E-02	Carcinogenic Effects				1.4E-02	Carcinogenic Effects
Bis(2-ethylhexyl) phthalate	4.0E+00	Cal Primary MCL	4.0E+00			2.5E+00	Carcinogenic Effects
Boron	1.0E+03	Cal DHS AL		1.0E+03	Cal DHS AL	1.4E+03	Noncarcinogenic Effects
Bromodichloromethane	1.0E+02	Cal Primary MCL	1.0E+02			5.6E-01	Carcinogenic Effects
Bromoform (Tribromomethane)	1.0E+02	Cal Primary MCL	1.0E+02			4.4E+00	Carcinogenic Effects
Bromomethane	9.8E+00	Noncarcinogenic Effects				9.8E+00	Noncarcinogenic Effects
Cadmium	5.0E+00	Cal Primary MCL	5.0E+00	7.0E-02	Cal OEHHA PHG	9.2E-02	Carcinogenic Effects
Carbon tetrachloride	5.0E-01	Cal Primary MCL	5.0E-01	1.0E-01	Cal OEHHA PHG	2.3E-01	Carcinogenic Effects
Chlordane	1.0E-01	Cal Primary MCL	1.0E-01	3.0E-02	Cal OEHHA PHG	2.7E-02	Carcinogenic Effects
p-Chloroaniline	2.8E+01	Noncarcinogenic Effects				2.8E+01	Noncarcinogenic Effects
Chlorobenzene	7.0E+01	Cal Primary MCL	7.0E+01	2.0E+02	Cal OEHHA PHG	1.4E+02	Noncarcinogenic Effects
Chloroethane	1.2E+01	Carcinogenic Effects				1.2E+01	Carcinogenic Effects

**Lookup Table D-3. Summary of Drinking Water Protection Values
(µg/L)**

Chemical	Final Screening Level	Basis	Cal Primary MCL	Other Criteria	Reference	*Risk-Based Goals	Basis
Chloroform	7.0E+01	Cal Primary MCL	7.0E+01			1.1E+00	Carcinogenic Effects
Chloromethane	1.8E+02	Noncarcinogenic Effects				1.8E+02	Noncarcinogenic Effects
2-Chlorophenol	3.5E+01	Noncarcinogenic Effects				3.5E+01	Noncarcinogenic Effects
Chromium (total)	5.0E+01	Cal Primary MCL	5.0E+01			-	-
Chromium III	2.0E+05	Cal OEHHA PHG		2.0E+05	Cal OEHHA PHG	1.1E+04	Noncarcinogenic Effects
Chromium VI	2.1E+01	Noncarcinogenic Effects				2.1E+01	Noncarcinogenic Effects
Chrysene	4.8E+00	Carcinogenic Effects				4.8E+00	Carcinogenic Effects
Cobalt	1.4E+02	Noncarcinogenic Effects				1.4E+02	Noncarcinogenic Effects
Copper	1.3E+03	Cal Primary MCL	1.3E+03	1.7E+02	Cal OEHHA PHG	2.8E+03	Noncarcinogenic Effects
Cyanide	1.5E+02	Cal Primary MCL	1.5E+02	1.5E+02	Cal OEHHA PHG	1.4E+02	Noncarcinogenic Effects
Dibenz(a,h)anthracene	4.8E-03	Carcinogenic Effects				4.8E-03	Carcinogenic Effects
Dibromochloromethane	1.0E+02	Cal Primary MCL	1.0E+02			4.2E-01	Carcinogenic Effects
1,2-dibromo-3-chloropropane	2.0E-01	Cal Primary MCL	2.0E-01	1.7E-03	Cal OEHHA PHG	5.0E-03	Carcinogenic Effects
1,2-Dibromoethane	5.0E-02	Cal Primary MCL	5.0E-02			9.7E-03	Carcinogenic Effects
1,2-Dichlorobenzene	6.0E+02	Cal Primary MCL	6.0E+02	6.0E+02	Cal OEHHA PHG	6.3E+02	Noncarcinogenic Effects
1,3-Dichlorobenzene	2.1E+02	Noncarcinogenic Effects				2.1E+02	Noncarcinogenic Effects
1,4-Dichlorobenzene	5.0E+00	Cal Primary MCL	5.0E+00	6.0E+00	Cal OEHHA PHG	1.5E+00	Carcinogenic Effects
3,3-Dichlorobenzidine	2.9E-02	Carcinogenic Effects				2.9E-02	Carcinogenic Effects
Dichlorodiphenyldichloroethane (DDD)	1.5E-01	Carcinogenic Effects				1.5E-01	Carcinogenic Effects
Dichlorodiphenyldichloroethene (DDE)	1.0E-01	Carcinogenic Effects				1.0E-01	Carcinogenic Effects
Dichlorodiphenyltrichloroethane (DDT)	1.0E-01	Carcinogenic Effects				1.0E-01	Carcinogenic Effects
1,1-Dichloroethane	5.0E+00	Cal Primary MCL	5.0E+00			6.1E+00	Carcinogenic Effects
1,2-Dichloroethane	5.0E-01	Cal Primary MCL	5.0E-01	4.0E-01	Cal OEHHA PHG	3.8E-01	Carcinogenic Effects
1,1-Dichloroethene	6.0E+00	Cal Primary MCL	6.0E+00	1.0E+01	Cal OEHHA PHG	3.5E+02	Noncarcinogenic Effects
<i>cis</i> -1,2-Dichloroethene	6.0E+00	Cal Primary MCL	6.0E+00	1.0E+02	Cal OEHHA PHG	7.0E+01	Noncarcinogenic Effects
<i>trans</i> -1,2-Dichloroethene	1.0E+01	Cal Primary MCL	1.0E+01	6.0E+01	Cal OEHHA PHG	1.4E+02	Noncarcinogenic Effects
2,4-Dichlorophenol	2.1E+01	Noncarcinogenic Effects				2.1E+01	Noncarcinogenic Effects
1,2-Dichloropropane	5.0E+00	Cal Primary MCL	5.0E+00	5.0E-01	Cal OEHHA PHG	5.1E-01	Carcinogenic Effects
1,3-Dichloropropene	5.0E-01	Cal Primary MCL	5.0E-01	2.0E-01	Cal OEHHA PHG	3.5E-01	Carcinogenic Effects

**Lookup Table D-3. Summary of Drinking Water Protection Values
(µg/L)**

Chemical	Final Screening Level	Basis	Cal Primary MCL	Other Criteria	Reference	*Risk-Based Goals	Basis
Dieldrin	2.2E-03	Carcinogenic Effects				2.2E-03	Carcinogenic Effects
Diethyl phthalate	5.6E+03	Noncarcinogenic Effects				5.6E+03	Noncarcinogenic Effects
Dimethyl phthalate	7.0E+04	Noncarcinogenic Effects				7.0E+04	Noncarcinogenic Effects
2,4-Dimethylphenol	1.0E+02	Cal DHS AL		1.0E+02	Cal DHS AL	1.4E+02	Noncarcinogenic Effects
2,4-Dinitrophenol	1.4E+02	Noncarcinogenic Effects				1.4E+02	Noncarcinogenic Effects
2,4-Dinitrotoluene	5.1E-02	Carcinogenic Effects				5.1E-02	Carcinogenic Effects
1,4-Dioxane	3.0E+00	Cal OEHHA PHG		3.0E+00	Cal OEHHA PHG	1.3E+00	Carcinogenic Effects
Dioxin (2,3,7,8-TCDD)	3.0E-05	Cal Primary MCL	3.0E-05			2.7E-07	Carcinogenic Effects
Endosulfan	4.2E+01	Noncarcinogenic Effects				4.2E+01	Noncarcinogenic Effects
Endrin	2.0E+00	Cal Primary MCL	2.0E+00	1.8E+00	Cal OEHHA PHG	2.1E+00	Noncarcinogenic Effects
Ethylbenzene	3.0E+02	Cal Primary MCL	3.0E+02	3.0E+02	Cal OEHHA PHG	3.2E+00	Carcinogenic Effects
Fluoranthene	2.8E+02	Noncarcinogenic Effects				2.8E+02	Noncarcinogenic Effects
Fluorene	2.8E+02	Noncarcinogenic Effects				2.8E+02	Noncarcinogenic Effects
Heptachlor	1.0E-02	Cal Primary MCL	1.0E-02	8.0E-03	Cal OEHHA PHG	7.8E-03	Carcinogenic Effects
Heptachlor epoxide	1.0E-02	Cal Primary MCL	1.0E-02	6.0E-03	Cal OEHHA PHG	3.8E-03	Carcinogenic Effects
Hexachlorobenzene	1.0E+00	Cal Primary MCL	1.0E+00			2.2E-02	Carcinogenic Effects
Hexachlorobutadiene	4.5E-01	Carcinogenic Effects				4.5E-01	Carcinogenic Effects
γ-Hexachlorocyclohexane (Lindane)	2.0E-01	Cal Primary MCL	2.0E-01			2.1E+00	Noncarcinogenic Effects
Hexachloroethane	9.0E-01	Carcinogenic Effects				9.0E-01	Carcinogenic Effects
Indeno(1,2,3-c,d)pyrene	4.8E-02	Carcinogenic Effects				4.8E-02	Carcinogenic Effects
Lead	1.5E+01	Cal Primary MCL	1.5E+01	2.0E+00	Cal OEHHA PHG	-	Noncarcinogenic Effects
Mercury (elemental)	2.0E+00	Cal Primary MCL	2.0E+00	1.2E+00	Cal OEHHA PHG	6.0E-01	Noncarcinogenic Effects
Methoxychlor	4.0E+01	Cal Primary MCL	4.0E+01	3.0E+01	Cal OEHHA PHG	0.0E+00	
Methylene chloride	5.0E+00	Cal Primary MCL	5.0E+00	4.0E+00	Cal OEHHA PHG	2.5E+00	Carcinogenic Effects
Methyl ethyl ketone	4.2E+03	Noncarcinogenic Effects				4.2E+03	Noncarcinogenic Effects
Methyl isobutyl ketone	1.2E+02	Cal DHS AL		1.2E+02	Cal DHS AL	6.0E+03	Noncarcinogenic Effects
Methyl mercury	7.0E-01	Noncarcinogenic Effects				7.0E-01	Noncarcinogenic Effects
2-Methylnaphthalene	2.8E+01	Noncarcinogenic Effects				2.8E+01	Noncarcinogenic Effects
tert-Butyl methyl ether	1.3E+01	Cal Primary MCL	1.3E+01	1.3E+01	Cal OEHHA PHG	3.8E+01	Carcinogenic Effects

**Lookup Table D-3. Summary of Drinking Water Protection Values
(µg/L)**

Chemical	Final Screening Level	Basis	Cal Primary MCL	Other Criteria	Reference	*Risk-Based Goals	Basis
Molybdenum	3.5E+01	Noncarcinogenic Effects				3.5E+01	Noncarcinogenic Effects
Naphthalene	1.7E+01	Cal DHS AL		1.7E+01	Cal DHS AL	1.4E+02	Noncarcinogenic Effects
Nickel	1.0E+02	Cal Primary MCL	1.0E+02	1.2E+01	Cal OEHHA PHG	1.4E+02	Noncarcinogenic Effects
Pentachlorophenol	1.0E+00	Cal Primary MCL	1.0E+00	4.0E-01	Cal OEHHA PHG	2.9E-01	Carcinogenic Effects
Perchlorate	6.0E+00	Cal Primary MCL	6.0E+00	6.0E+00	Cal OEHHA PHG	4.9E+00	Noncarcinogenic Effects
Phenanthrene	2.1E+02	Noncarcinogenic Effects				2.1E+02	Noncarcinogenic Effects
Phenol	4.2E+03	Cal DHS AL		4.2E+03	Cal DHS AL	2.1E+03	Noncarcinogenic Effects
Polychlorinated biphenyls (PCBs)	5.0E-01	Cal Primary MCL	5.0E-01			1.8E-02	Carcinogenic Effects
Pyrene	4.2E+02	Noncarcinogenic Effects				4.2E+02	Noncarcinogenic Effects
Selenium	5.0E+01	Cal Primary MCL	5.0E+01			3.5E+01	Noncarcinogenic Effects
Silver	3.5E+01	Noncarcinogenic Effects				3.5E+01	Noncarcinogenic Effects
Styrene	1.0E+02	Cal Primary MCL	1.0E+02			1.4E+03	Noncarcinogenic Effects
<i>tert</i> -Butyl alcohol	1.2E+01	Cal DHS NL		1.2E+01	Cal DHS NL	0.0E+00	
1,1,1,2-Tetrachloroethane	1.3E+00	Carcinogenic Effects				1.3E+00	Carcinogenic Effects
1,1,2,2-Tetrachloroethane	1.0E+00	Cal Primary MCL	1.0E+00			1.8E-01	Carcinogenic Effects
Tetrachloroethene	5.0E+00	Cal Primary MCL	5.0E+00	6.0E-02	Cal OEHHA PHG	6.5E-02	Carcinogenic Effects
Thallium	2.0E+00	Cal Primary MCL	2.0E+00	1.0E-01	Cal OEHHA PHG	5.6E-01	Noncarcinogenic Effects
Toluene	1.5E+02	Cal Primary MCL	1.5E+02	1.5E+02	Cal OEHHA PHG	1.4E+03	Noncarcinogenic Effects
Toxaphene	3.0E+00	Cal Primary MCL	3.0E+00			2.9E-02	Carcinogenic Effects
TPH (gasolines)	2.1E+02	Noncarcinogenic Effects				2.1E+02	Noncarcinogenic Effects
TPH (middle distillates)	2.1E+02	Noncarcinogenic Effects				2.1E+02	Noncarcinogenic Effects
TPH (residual fuels)	2.1E+02	Noncarcinogenic Effects				2.1E+02	Noncarcinogenic Effects
1,2,4-Trichlorobenzene	5.0E+00	Cal Primary MCL	5.0E+00	5.0E+00	Cal OEHHA PHG	9.7E+00	Carcinogenic Effects
1,1,1-Trichloroethane	2.0E+02	Cal Primary MCL	2.0E+02	1.0E+03	Cal OEHHA PHG	2.0E+03	Noncarcinogenic Effects
1,1,2-Trichloroethane	5.0E+00	Cal Primary MCL	5.0E+00	2.0E-01	Cal OEHHA PHG	4.9E-01	Carcinogenic Effects
Trichloroethene	5.0E+00	Cal Primary MCL	5.0E+00	8.0E-01	Cal OEHHA PHG	2.1E+00	Noncarcinogenic Effects
2,4,5-Trichlorophenol	7.0E+02	Noncarcinogenic Effects				7.0E+02	Noncarcinogenic Effects
2,4,6-Trichlorophenol	7.0E-01	Noncarcinogenic Effects				7.0E-01	Noncarcinogenic Effects
Vanadium	1.5E+01	Cal DHS AL		1.5E+01	Cal DHS AL	7.0E+00	Noncarcinogenic Effects

**Lookup Table D-3. Summary of Drinking Water Protection Values
(µg/L)**

Chemical	Final Screening Level	Basis	Cal Primary MCL	Other Criteria	Reference	*Risk-Based Goals	Basis
Vinyl chloride	5.0E-01	Cal Primary MCL	5.0E-01	5.0E-02	Cal OEHHA PHG	2.3E-02	Carcinogenic Effects
Xylenes	1.8E+03	Cal Primary MCL	1.8E+03	1.8E+03	Cal OEHHA PHG	1.4E+03	Noncarcinogenic Effects
Zinc	5.0E+03	Cal Primary MCL	5.0E+03			2.1E+03	Noncarcinogenic Effects

Source (unless otherwise noted):

A Compilation of Water Quality Goals and updates,

Notes:

Used for development of groundwater and soil protection values.

TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.

Final health-based protection value for drinking water: Cal EPA Primary MCL or, in order of preference and availability, CalEPA Public Health Goal, Cal DHS Action Level and risk-based goal.

Cal DHS MCL: California EPA Department of Health Services Maximum Concentration Level.

OEHHA PHG: California Office of Environmental Health Hazard Assessment Public Health Goal.

Cal DHS AL: California Department of Health Services Action Level based on toxicity to humans.

Cal DHS NL: California Department of Health Services Notification Level

Calculated goals for carcinogenic effects based on target excess cancer risk of 10^{-6} (see Chapter 2 of text).

All water associated with the Snake River Plain Aquifer is considered to be a drinking water source.

**Lookup Table D-4. Summary of Selected Aquatic Habitat Goals
(µg/L)**

Chemical	Lowest Freshwater Aquatic Habitat Goal	Basis
Acenaphthene	2.3E+01	US EPA Ecotox FW Chronic
Acenaphthylene	3.0E+01	10% US EPA SW Acute LOEL
Acetone	1.5E+03	USDOE FW Chronic PRG
Aldrin	3.0E-01	10% CTR FW CMC
Anthracene	7.3E-01	USDOE FW Chronic PRG
Antimony	3.0E+01	US EPA FW CCC
Arsenic	1.5E+02	CTR FW CCC
Barium	1.0E+03	=Drinking Water Goal (Table F-3)
Benzene	4.6E+01	US EPA Ecotox FW Chronic
Benzo(a)anthracene	2.7E-02	USDOE FW Chronic PRG
Benzo(b)fluoranthene	2.9E-02	=Drinking Water Goal (Table F-3)
Benzo(k)fluoranthene	3.7E+00	50% MOEE FW Chronic LOEL
Benzo(g,h,i)perylene	1.0E-01	50% MOEE FW Chronic LOEL
Benzo(a)pyrene	1.4E-02	US EPA Ecotox FW Chronic
Beryllium	2.7E+00	50% US EPA FW Chronic LOEL
1,1-Biphenyl	1.4E+01	US EPA Ecotox FW Chronic
Bis(2-chloroethyl) ether	6.1E+01	50% US EPA FW Chronic LOEL
Bis(2-chloroisopropyl) ether	6.1E+01	50% US EPA FW Chronic LOEL
Bis(2-ethylhexyl) phthalate	3.2E+01	US EPA Ecotox FW Chronic
Boron	1.6E+00	USDOE FW Chronic PRG
Bromodichloromethane	1.1E+03	10% US EPA FW Acute LOEL
Bromoform (Tribromomethane)	1.1E+03	10% US EPA FW Acute LOEL
Bromomethane	1.6E+02	50% MOEE FW Chronic LOEL
Cadmium	2.5E-01	US EPA FW CCC
Carbon tetrachloride	9.8E+00	USDOE FW Chronic PRG
Chlordane	4.3E-03	CTR FW CCC
p-Chloroaniline	5.0E+00	50% MOEE FW Chronic LOEL
Chlorobenzene	2.5E+01	50% US EPA FW Chronic LOEL

**Lookup Table D-4. Summary of Selected Aquatic Habitat Goals
(µg/L)**

Chemical	Lowest Freshwater Aquatic Habitat Goal	Basis
Chloroethane	1.2E+01	=Drinking Water Goal (Table F-3)
Chloroform	6.2E+02	50% US EPA FW Chronic LOEL
Chloromethane	1.1E+03	10% US EPA FW Acute LOEL
2-Chlorophenol	4.4E+02	10% US EPA FW Acute LOEL
Chromium (total)	1.8E+02	CTR FW CCC
Chromium III	1.8E+02	CTR FW CCC
Chromium VI	1.1E+01	CTR FW CCC
Chrysene	3.5E-01	50% MOEE FW Chronic LOEL
Cobalt	3.0E+00	US EPA Ecotox FW Chronic
Copper	9.0E+00	CTR FW CCC
Cyanide	5.2E+00	CTR FW CCC
Dibenz(a,h)anthracene	7.5E+00	50% MOEE FW Chronic LOEL
Dibromochloromethane	1.1E+03	10% US EPA FW Acute LOEL
1,2-dibromo-3-chloropropane	2.0E-01	=Drinking Water Goal (Table F-3)
1,2-Dibromoethane	1.4E+03	50% MOEE FW Chronic AWQC
1,2-Dichlorobenzene	1.4E+01	US EPA Ecotox FW Chronic
1,3-Dichlorobenzene	7.1E+01	US EPA Ecotox FW Chronic
1,4-Dichlorobenzene	1.5E+01	US EPA Ecotox FW Chronic
3,3-Dichlorobenzidine	2.5E+02	50% MOEE FW Chronic LOEL
Dichlorodiphenyldichloroethane (DDD)	1.0E-03	=DDT
Dichlorodiphenyldichloroethene (DDE)	1.0E-03	=DDT
Dichlorodiphenyltrichloroethane (DDT)	1.0E-03	CTR FW CCC
1,1-Dichloroethane	4.7E+01	US EPA Ecotox FW Chronic
1,2-Dichloroethane	1.0E+04	50% US EPA FW Chronic LOEL
1,1-Dichloroethene	2.5E+01	USDOE FW Chronic PRG
<i>cis</i> -1,2-Dichloroethene	5.9E+02	USDOE FW Chronic PRG
<i>trans</i> -1,2-Dichloroethene	5.9E+02	USDOE FW Chronic PRG
2,4-Dichlorophenol	1.8E+02	50% US EPA FW Chronic LOEL

**Lookup Table D-4. Summary of Selected Aquatic Habitat Goals
(µg/L)**

Chemical	Lowest Freshwater Aquatic Habitat Goal	Basis
1,2-Dichloropropane	2.9E+03	50% US EPA FW Chronic LOEL
1,3-Dichloropropene	1.2E+02	50% US EPA FW Chronic LOEL
Dieldrin	5.6E-02	CTR FW CCC
Diethyl phthalate	1.5E+00	50% US EPA FW Chronic LOEL
Dimethyl phthalate	1.5E+00	50% US EPA FW Chronic LOEL
2,4-Dimethylphenol	5.3E+02	US EPA FW CCC
2,4-Dinitrophenol	7.5E+01	50% US EPA FW Chronic LOEL
2,4-Dinitrotoluene	1.2E+02	50% US EPA FW Chronic LOEL
1,4-Dioxane	3.4E+05	5% Acute FW LC50
Dioxin (2,3,7,8-TCDD)	5.0E-06	50% US EPA FW Chronic LOEL
Endosulfan	5.6E-02	CTR FW CCC
Endrin	3.6E-02	CTR FW CCC
Ethylbenzene	2.9E+02	US EPA Ecotox FW Chronic
Fluoranthene	8.1E+00	US EPA Ecotox FW Chronic
Fluorene	3.9E+00	US EPA Ecotox FW Chronic
Heptachlor	3.8E-03	CTR FW CCC
Heptachlor epoxide	3.8E-03	CTR FW CCC
Hexachlorobenzene	3.7E+00	US EPA FW CCC
Hexachlorobutadiene	4.7E+00	50% US EPA FW Chronic LOEL
γ-Hexachlorocyclohexane (Lindane)	8.0E-02	US EPA Ecotox FW Chronic
Hexachloroethane	1.2E+01	US EPA Ecotox FW Chronic
Indeno(1,2,3-c,d)pyrene	4.8E-02	=Drinking Water Goal (Table F-3)
Lead	2.5E+00	CTR FW CCC
Mercury (elemental)	2.5E-02	Basin Plan
Methoxychlor	1.9E-02	US EPA Ecotox FW Chronic
Methylene chloride	2.2E+03	USDOE FW Chronic PRG
Methyl ethyl ketone	1.4E+04	USDOE FW Chronic PRG
Methyl isobutyl ketone	1.7E+02	USDOE FW Chronic PRG

**Lookup Table D-4. Summary of Selected Aquatic Habitat Goals
(µg/L)**

Chemical	Lowest Freshwater Aquatic Habitat Goal	Basis
Methyl mercury	3.0E-03	US EPA Ecotox FW Chronic
2-Methylnaphthalene	2.1E+00	USDOE FW Chronic PRG
<i>tert</i> -Butyl methyl ether	6.6E+04	CTR FW CCC
Molybdenum	2.4E+02	US EPA Ecotox FW Chronic
Naphthalene	2.4E+01	US EPA Ecotox FW Chronic
Nickel	5.2E+01	CTR FW CCC
Pentachlorophenol	1.5E+01	CTR FW CCC
Perchlorate	6.0E+02	US EPA Ecotox FW Chronic
Phenanthrene	6.3E+00	US EPA FW CCC
Phenol	1.3E+03	50% US EPA FW Chronic LOEL
Polychlorinated biphenyls (PCBs)	1.4E-02	CTR FW CCC
Pyrene	2.0E+00	50% MOEE FW Chronic LOEL
Selenium	5.0E+00	CTR FW CCC
Silver	3.4E-01	10% CTR FW CMC
Styrene	1.0E+02	=Drinking Water Goal (Table F-3)
<i>tert</i> -Butyl alcohol	1.8E+04	10% Acute FW LC0
1,1,1,2-Tetrachloroethane	9.3E+02	10% US EPA FW Acute LOEL
1,1,2,2-Tetrachloroethane	4.2E+02	US EPA Ecotox FW Chronic
Tetrachloroethene	1.2E+02	US EPA Ecotox FW Chronic
Thallium	2.0E+01	50% US EPA FW Chronic LOEL
Toluene	1.3E+02	US EPA Ecotox FW Chronic
Toxaphene	2.0E-04	CTR FW CCC
TPH (gasolines)	2.1E+02	=Drinking Water Goal (Table F-3)
TPH (middle distillates)	2.1E+02	=Drinking Water Goal (Table F-3)
TPH (residual fuels)	2.1E+02	=Drinking Water Goal (Table F-3)
1,2,4-Trichlorobenzene	2.5E+01	50% US EPA FW Chronic LOEL
1,1,1-Trichloroethane	6.2E+01	US EPA Ecotox FW Chronic
1,1,2-Trichloroethane	4.7E+03	50% US EPA FW Chronic LOEL

**Lookup Table D-4. Summary of Selected Aquatic Habitat Goals
(µg/L)**

Chemical	Lowest Freshwater Aquatic Habitat Goal	Basis
Trichloroethene	3.6E+02	US EPA Ecotox FW Chronic
2,4,5-Trichlorophenol	6.3E+01	US EPA FW CCC
2,4,6-Trichlorophenol	4.9E+02	50% US EPA FW Chronic LOEL
Vanadium	1.9E+01	US EPA Ecotox FW Chronic
Vinyl chloride	7.8E+02	USDOE FW Chronic PRG
Xylenes	1.0E+02	5% acute SW LC 50
Zinc	1.2E+02	CTR FW CCC

Notes:

1. Lowest Estuary Goal = Lowest of Freshwater vs Marine chronic goals. Used for development of groundwater and soil protection values.

Aquatic Habitat Goals: Addresses potential impact on freshwater or marine aquatic habitats. Final protection values are lowest of marine and freshwater criteria.

See text for prioritization and selection of surface water quality protection values. CTR HH criteria for potential bioaccumulation of chemicals in aquatic life considered in surface water protection values only (refer to main text).

Drinking water goal substituted as aquatic habitat goal if later was not available (see text).

Review of aquatic ecotoxicity data for ethanol underway. Based on preliminary review of available data, chronic toxicity protection values likely to be significantly greater than ceiling level of 50,000 µg/L (see Table I series). Refer to USEPA 2003b, ECOTOX database).

Methyl tert-Butyl Ether: Interim salt water CCC proposed by Region 2 Water Quality Control Board (RWQCBSF, 1998b)

TPH protection values: Based on TPH protection values published in RWQCB Board Orders. See footnotes for Table F-4b.

AWQC: Aquatic Water Quality Criteria

CCC: Criterion for Continuous Concentration

CMC: Criterion for Maximum Concentration

CTR: California (interim) Toxics Rule (in RWQCBCV 2000 and Federal Register 2000)

FCV: Final Chronic Value

FW: Freshwater

LOEL: Lowest Observed Effects Level

MOEE: Ontario Ministry of Environment and Energy (MOEE 1996)

PRG: USDOE Preliminary Remediation Goal for ecological concerns.

**Lookup Table D-4. Summary of Selected Aquatic Habitat Goals
(µg/L)**

Chemical	Lowest Freshwater Aquatic Habitat Goal	Basis
<p>SW: Saltwater</p> <p>TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.</p> <p>USDOE: U. S. Department of Energy</p> <p>USEPA: U.S. Environmental Protection Agency</p> <p>All water associated with the Snake River Plain Aquifer is considered to be a drinking water source.</p>		

**Lookup Table D-5. Summary of US EPA and Other Published Aquatic Habitat Goals
(µg/L)**

Chemical	Freshwater							Other	
	USEPA CCC	USEPA Chronic LOEL	USEPA CMC	USEPA Acute LOEL	Ecotox Chronic Threshold (AWQC, FCV Or Tier II)	Other	Basis	Value	Basis
Acenaphthene		5.2E+02		1.7E+03	2.3E+01				
Acenaphthylene									
Acetone						1.5E+03	USDOE FW Chronic PRG		
Aldrin			3.0E+00						
Anthracene						7.3E-01	USDOE FW Chronic PRG		
Antimony	3.0E+01		8.8E+01						
Arsenic	1.5E+02		3.4E+02		1.9E+02				
Barium									
Benzene				5.3E+03	4.6E+01				
Benzo(a)anthracene						2.7E-02	USDOE FW Chronic PRG		
Benzo(b)fluoranthene									
Benzo(k)fluoranthene						3.7E+00	50% MOEE FW Chronic LOEL		
Benzo(g,h,i)perylene						1.0E-01	50% MOEE FW Chronic LOEL		
Benzo(a)pyrene					1.4E-02				
Beryllium		5.3E+00		1.3E+02	5.1E+00				
1,1-Biphenyl					1.4E+01				
Bis(2-chloroethyl) ether		1.2E+02		2.4E+05					
Bis(2-chloroisopropyl) ether		1.2E+02		2.4E+05					
Bis(2-ethylhexyl) phthalate					3.2E+01				
Boron						1.6E+00	USDOE FW Chronic PRG		
Bromodichloromethane				1.1E+04					
Bromoform (Tribromomethane)				1.1E+04					
Bromomethane				1.1E+04		1.6E+02	50% MOEE FW Chronic LOEL		
Cadmium	2.5E-01		2.0E+00		1.0E+00				
Carbon tetrachloride				3.5E+04		9.8E+00	USDOE FW Chronic PRG		
Chlordane	4.3E-03		2.4E+00						

**Lookup Table D-5. Summary of US EPA and Other Published Aquatic Habitat Goals
(µg/L)**

Chemical	Freshwater							Other	
	USEPA CCC	USEPA Chronic LOEL	USEPA CMC	USEPA Acute LOEL	Ecotox Chronic Threshold (AWQC, FCV Or Tier II)	Other	Basis	Value	Basis
p-Chloroaniline						5.0E+00	50% MOEE FW Chronic LOEL		
Chlorobenzene		5.0E+01		2.5E+02	1.3E+02				
Chloroethane									
Chloroform		1.2E+03		2.9E+04		2.8E+01	USDOE FW Chronic PRG		
Chloromethane				1.1E+04					
2-Chlorophenol				4.4E+03					
Chromium (total)									
Chromium III	7.4E+01		5.7E+02		1.8E+02				
Chromium VI	1.1E+01		1.6E+01		1.0E+01				
Chrysene						3.5E-01	50% MOEE FW Chronic LOEL		
Cobalt					3.0E+00				
Copper	9.0E+00		1.3E+01		1.1E+01				
Cyanide	5.2E+00		2.2E+01		5.2E+00				
Dibenz(a,h)anthracene						7.5E+00	50% MOEE FW Chronic LOEL		
Dibromochloromethane				1.1E+04					
1,2-dibromo-3-chloropropane									
1,2-Dibromoethane						1.4E+03	50% MOEE FW Chronic AWQC		
1,2-Dichlorobenzene		7.6E+02		1.1E+03	1.4E+01				
1,3-Dichlorobenzene		7.6E+02		1.1E+03	7.1E+01				
1,4-Dichlorobenzene		7.6E+02		1.1E+03	1.5E+01				
3,3-Dichlorobenzidine						2.5E+02	50% MOEE FW Chronic LOEL		
Dichlorodiphenyldichloroethane (DDD)				6.0E-01		1.0E-03	=DDT	1.0E-03	=DDT
Dichlorodiphenyldichloroethene (DDE)				1.1E+03		1.0E-03	=DDT	1.0E-03	=DDT
Dichlorodiphenyltrichloroethane (DDT)	1.0E-03		1.1E+00		1.3E-02				
1,1-Dichloroethane					4.7E+01				
1,2-Dichloroethane		2.0E+04		1.2E+05		9.1E+02	USDOE FW Chronic PRG		

**Lookup Table D-5. Summary of US EPA and Other Published Aquatic Habitat Goals
(µg/L)**

Chemical	Freshwater						Other		
	USEPA CCC	USEPA Chronic LOEL	USEPA CMC	USEPA Acute LOEL	Ecotox Chronic Threshold (AWQC, FCV Or Tier II)	Other	Basis	Value	Basis
Lead	2.5E+00		6.5E+01		2.5E+00				
Mercury (elemental)	7.7E-01		1.4E+00		1.3E+00				
Methoxychlor			3.0E-02		1.9E-02				
Methylene chloride				1.1E+04		2.2E+03	USDOE FW Chronic PRG		
Methyl ethyl ketone						1.4E+04	USDOE FW Chronic PRG		
Methyl isobutyl ketone						1.7E+02	USDOE FW Chronic PRG		
Methyl mercury					3.0E-03				
2-Methylnaphthalene						2.1E+00	USDOE FW Chronic PRG		
<i>tert</i> -Butyl methyl ether									
Molybdenum					2.4E+02				
Naphthalene		6.2E+02		2.3E+03	2.4E+01				
Nickel	5.2E+01		4.7E+02		1.6E+02				
Pentachlorophenol	1.5E+01		1.9E+01		1.3E+01				
Perchlorate					6.0E+02				
Phenanthrene	6.3E+00		3.0E+01		6.3E+00				
Phenol		2.56E+03		1.02E+04					
Polychlorinated biphenyls (PCBs)	1.4E-02				1.9E-01				
Pyrene						2.0E+00	50% MOEE FW Chronic LOEL		
Selenium	5.0E+00				5.0E+00				
Silver			3.2E+00						
Styrene									
<i>tert</i> -Butyl alcohol						1.8E+04	10% Acute FW LC0		
1,1,1,2-Tetrachloroethane				9.32E+03					
1,1,2,2-Tetrachloroethane		2.4E+03		9.32E+03	4.2E+02				
Tetrachloroethene		8.4E+02		5.28E+03	1.2E+02				
Thallium		4.0E+01		1.4E+03					

**Lookup Table D-5. Summary of US EPA and Other Published Aquatic Habitat Goals
(µg/L)**

Chemical	Freshwater							Other	
	USEPA CCC	USEPA Chronic LOEL	USEPA CMC	USEPA Acute LOEL	Ecotox Chronic Threshold (AWQC, FCV Or Tier II)	Other	Basis	Value	Basis
Toluene				1.75E+04	1.3E+02				
Toxaphene	2.0E-04		7.3E-01		1.1E-02				
TPH (gasolines)									
TPH (middle distillates)									
TPH (residual fuels)									
1,2,4-Trichlorobenzene		5.0E+01		2.5E+02	1.1E+02				
1,1,1-Trichloroethane				1.8E+04	6.2E+01				
1,1,2-Trichloroethane		9.4E+03		1.8E+04					
Trichloroethene		2.19E+04		4.5E+04	3.6E+02				
2,4,5-Trichlorophenol	6.3E+01		1.0E+02						
2,4,6-Trichlorophenol		9.7E+02							
Vanadium					1.9E+01				
Vinyl chloride						7.82E+02	USDOE FW Chronic PRG		
Xylenes								1.0E+02	5% acute SW LC 50
Zinc	1.2E+02		1.2E+02		1.0E+02				

References:
 Primary sources USEPA (1996b); MOEE (1996), USDOE (1997). USEPA criteria summarized in A Compilation of Water Quality Goals (August 2003), CalEPA RWQCB Central Valley Region (RWQCB CV 2003 and updates).
 LC₅₀ values for 1,4 Dioxane presented in "Solvent Stabilizers White Paper" (Mohr 2001).
 Chronic goal for perchlorate from "Perchlorate Environmental Contamination (draft)" (USEPA 1998).

Notes:
 Used for development of groundwater and soil protection values.
 See text for prioritization and selection of surface water quality protection values.
 Lowest Chronic Aquatic Habitat Goal: Addresses potential impact on freshwater or marine aquatic life.
 Acute LOEL and CMC criteria divided by a factor of ten if selected as lowest protection value. LC50 divided by factor of twenty.
 Barium aquatic habitat goal presented in USEPA Ecotox document not considered for screening of groundwater due to low confidence in goals and elevated

**Lookup Table D-5. Summary of US EPA and Other Published Aquatic Habitat Goals
(µg/L)**

	Freshwater							Other	
	USEPA CCC	USEPA Chronic LOEL	USEPA CMC	USEPA Acute LOEL	Ecotox Chronic Threshold (AWQC, FCV Or Tier II)	Other	Basis	Value	Basis
Chemical									
<p>background concentrations of barium in Bay area groundwater.</p> <p><i>tert</i>-Butyl Alcohol (TBA): Chronic aquatic goal based on in-house review of USEPA ECOTOX database for TBA (USEPA 2003b). Ten percent of LC0 concentration for <i>Lepomis macrochirus</i> (<i>Bluegill</i>) selected as most conservative goal of data presented.</p> <p>Xylenes: Acute saltwater protection value based on review on data in UK Marine SAC summary and marine LC50 of 2.0 mg/L (Cole et al., 1999). Confidence in USDOE PRG and USEPA Ecotox goals low.</p> <p>AWQC: Aquatic Water Quality Criteria</p> <p>CCC: Criterion for Continuous Concentration</p> <p>CMC: Criterion for Maximum Concentration</p> <p>FCV: Final Chronic Value</p> <p>FW: Freshwater</p> <p>LOEL: Lowest Observed Effects Level</p> <p>MOEE: Ontario Ministry of Environment and Energy (MOEE 1996)</p> <p>PRG: USDOE Preliminary Remediation Goal for ecological concerns.</p> <p>SW: Saltwater</p> <p>TPH Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.</p> <p>USDOE: U. S. Department of Energy</p> <p>USEPA: U.S. Environmental Protection Agency</p> <p>All water associated with the Snake River Plain Aquifer is considered to be a drinking water source.</p>									

**Lookup Table D-6. Surface Water Quality Standards for Bioaccumulation and Human Consumption
of Aquatic Organisms
(µg/L)**

Chemical	Selected Criteria	California Toxics Rule	²USEPA NWQC
Acenaphthene	2.7E+03	2.7E+03	9.9E+02
Acenaphthylene			
Acetone			
Aldrin	1.4E-04	1.4E-04	5.0E-05
Anthracene	1.1E+05	1.1E+05	4.0E+04
Antimony	4.3E+03	4.3E+03	6.4E+02
Arsenic	1.4E-01		1.4E-01
Barium			
Benzene	7.1E+01	7.1E+01	5.1E+01
Benzo(a)anthracene	4.9E-02	4.9E-02	1.8E-02
Benzo(b)fluoranthene	4.9E-02	4.9E-02	1.8E-02
Benzo(k)fluoranthene	4.9E-02	4.9E-02	1.8E-02
Benzo(g,h,i)perylene			
Benzo(a)pyrene	4.9E-02	4.9E-02	1.8E-02
Beryllium			
1,1-Biphenyl			
Bis(2-chloroethyl) ether	1.4E+00	1.4E+00	5.3E-01
Bis(2-chloroisopropyl) ether	1.7E+05	1.7E+05	6.5E+04
Bis(2-ethylhexyl) phthalate	5.9E+00	5.9E+00	2.2E+00
Boron			
Bromodichloromethane			
Bromoform (Tribromomethane)	3.6E+02	3.6E+02	1.4E+02
Bromomethane	4.0E+03	4.0E+03	1.5E+03
Cadmium			
Carbon tetrachloride	4.4E+00	4.4E+00	1.6E+00
Chlordane	5.9E-04	5.9E-04	8.1E-04
<i>p</i> -Chloroaniline			
Chlorobenzene	2.1E+04	2.1E+04	2.1E+04

**Lookup Table D-6. Surface Water Quality Standards for Bioaccumulation and Human Consumption
of Aquatic Organisms
(µg/L)**

Chemical	Selected Criteria	California Toxics Rule	² USEPA NWQC
Chloroethane			
Chloroform	4.7E+02	4.7E+02	4.7E+02
Chloromethane			
2-Chlorophenol	4.0E+02	4.0E+02	1.5E+02
Chromium (total)			
Chromium III			
Chromium VI			
Chrysene	4.9E-02	4.9E-02	1.8E-02
Cobalt			
Copper			
Cyanide	2.2E+05	2.2E+05	2.2E+05
Dibenz(a,h)anthracene	4.9E-02	4.9E-02	1.8E-02
Dibromochloromethane	4.6E+01	4.6E+01	1.3E+01
1,2-dibromo-3-chloropropane			
1,2-Dibromoethane			
1,2-Dichlorobenzene	1.7E+04	1.7E+04	1.7E+04
1,3-Dichlorobenzene	2.6E+03	2.6E+03	9.6E+02
1,4-Dichlorobenzene	2.6E+03	2.6E+03	2.6E+03
3,3-Dichlorobenzidine	7.7E-02	7.7E-02	2.8E-02
Dichlorodiphenyldichloroethane (DDD)	8.4E-04	8.4E-04	3.1E-04
Dichlorodiphenyldichloroethene (DDE)	5.9E-04	5.9E-04	2.2E-04
Dichlorodiphenyltrichloroethane (DDT)	5.9E-04	5.9E-04	2.2E-04
1,1-Dichloroethane			
1,2-Dichloroethane	9.9E+01	9.9E+01	3.7E+01
1,1-Dichloroethene	3.2E+00	3.2E+00	3.2E+00
<i>cis</i> -1,2-Dichloroethene			
<i>trans</i> -1,2-Dichloroethene	1.4E+05	1.4E+05	1.4E+05
2,4-Dichlorophenol	7.9E+02	7.9E+02	2.9E+02

**Lookup Table D-6. Surface Water Quality Standards for Bioaccumulation and Human Consumption
of Aquatic Organisms
(µg/L)**

Chemical	Selected Criteria	California Toxics Rule	² USEPA NWQC
1,2-Dichloropropane	3.9E+01	3.9E+01	1.5E+01
1,3-Dichloropropene	1.7E+03	1.7E+03	1.7E+03
Dieldrin	1.4E-04	1.4E-04	5.4E-05
Diethyl phthalate	1.2E+54	1.2E+54	4.4E+04
Dimethyl phthalate	2.9E+06	2.9E+06	1.1E+06
2,4-Dimethylphenol	2.3E+03	2.3E+03	8.5E+02
2,4-Dinitrophenol	1.4E+04	1.4E+04	5.3E+03
2,4-Dinitrotoluene	9.1E+00	9.1E+00	3.4E+00
1,4-Dioxane			
Dioxin (2,3,7,8-TCDD)	1.4E-08	1.4E-08	5.1E-09
Endosulfan	2.4E+02	2.4E+02	8.9E+01
Endrin	8.1E-01	8.1E-01	8.1E-01
Ethylbenzene	2.9E+04	2.9E+04	2.9E+04
Fluoranthene	3.7E+02	3.7E+02	1.4E+02
Fluorene	1.4E+04	1.4E+04	5.3E+03
Heptachlor	2.1E-04	2.1E-04	7.9E-05
Heptachlor epoxide	1.1E-04	1.1E-04	3.9E-05
Hexachlorobenzene	7.7E-04	7.7E-04	2.9E-04
Hexachlorobutadiene	5.0E+01	5.0E+01	1.8E+01
γ-Hexachlorocyclohexane (Lindane)	6.3E-02	6.3E-02	6.3E-02
Hexachloroethane	8.9E+00	8.9E+00	3.3E+00
Indeno(1,2,3-c,d)pyrene	4.9E-02	4.9E-02	1.8E-02
Lead			
Mercury (elemental)	5.1E-02	5.1E-02	3.0E-01
Methoxychlor			
Methylene chloride	1.6E+03	1.6E+03	5.9E+02
Methyl ethyl ketone			
Methyl isobutyl ketone			

**Lookup Table D-6. Surface Water Quality Standards for Bioaccumulation and Human Consumption
of Aquatic Organisms
(µg/L)**

Chemical	Selected Criteria	California Toxics Rule	² USEPA NWQC
Methyl mercury			
2-Methylnaphthalene			
<i>tert</i> -Butyl methyl ether			
Molybdenum			
Naphthalene			
Nickel	4.6E+03	4.6E+03	4.6E+03
Pentachlorophenol	8.2E+00	8.2E+00	3.0E+00
Perchlorate			
Phenanthrene			
Phenol	4.6E+06	4.6E+06	1.7E+06
Polychlorinated biphenyls (PCBs)	1.7E-04	1.7E-04	6.4E-05
Pyrene	1.1E+04	1.1E+04	4.0E+03
Selenium			
Silver			
Styrene			
<i>tert</i> -Butyl alcohol			
1,1,1,2-Tetrachloroethane			
1,1,2,2-Tetrachloroethane	1.1E+01	1.1E+01	4.0E+00
Tetrachloroethene	8.9E+00	8.9E+00	3.3E+00
Thallium	6.3E+00	6.3E+00	6.3E+00
Toluene	2.0E+05	2.0E+05	2.0E+05
Toxaphene	7.5E-04	7.5E-04	2.8E-04
TPH (gasolines)			
TPH (middle distillates)			
TPH (residual fuels)			
1,2,4-Trichlorobenzene			
1,1,1-Trichloroethane			
1,1,2-Trichloroethane	4.2E+01	4.2E+01	1.6E+01

**Lookup Table D-6. Surface Water Quality Standards for Bioaccumulation and Human Consumption
of Aquatic Organisms
(µg/L)**

Chemical	Selected Criteria	California Toxics Rule	²USEPA NWQC
Trichloroethene	8.1E+01	8.1E+01	3.0E+01
2,4,5-Trichlorophenol	3.6E+03		3.6E+03
2,4,6-Trichlorophenol	6.5E+00	6.5E+00	
Vanadium			
Vinyl chloride	5.3E+02	5.3E+02	5.3E+02
Xylenes			
Zinc			

References:

- 40 CFR Part 131: Water Quality Standards; Establishment of Numerical Criteria for Priority Toxic Pollutants for the State of California: Federal Register, May 18, 2000.
- USEPA National Recommended Water Quality Criteria: 2002, EPA-822-R-02-047.

Notes:

California CTR goals considered for surface water (see Tables F-2 series) if available.

Addresses potential accumulation of chemical in aquatic organisms and subsequent consumption by humans.

All water associated with the Snake River Plain Aquifer is considered to be a drinking water source.

**Lookup Table D-7. US EPA Region 9
Tap Water Goals
(µg/L)**

Chemical	Tap Water Goal (NonCarcinogenic Effects)	Tap Water Goal (Carcinogenic Effects)
Acenaphthene	3.7E+02	
Acenaphthylene	1.8E+02	
Acetone	5.5E+03	
Aldrin	1.1E+00	4.0E-03
Anthracene	1.8E+03	
Antimony	1.5E+01	
Arsenic	1.1E+01	4.5E-02
Barium	7.3E+03	
Benzene	4.4E+01	1.1E-01
Benzo(a)anthracene	1.1E+03	5.6E-02
Benzo(b)fluoranthene	1.1E+03	5.6E-02
Benzo(k)fluoranthene	1.1E+03	5.6E-02
Benzo(g,h,i)perylene	1.1E+03	
Benzo(a)pyrene	1.1E+03	5.6E-03
Beryllium	7.3E+01	
1,1-Biphenyl	1.8E+03	
Bis(2-chloroethyl) ether		9.8E-03
Bis(2-chloroisopropyl) ether	2.4E+02	4.5E-03
Bis(2-ethylhexyl) phthalate	7.3E+02	4.8E+00
Boron	7.3E+03	
Bromodichloromethane	1.2E+02	1.8E-01
Bromoform (Tribromomethane)	7.3E+02	8.5E+00
Bromomethane	8.7E+00	
Cadmium	1.8E+01	1.8E-01
Carbon tetrachloride	2.0E+01	2.8E-02
Chlordane	1.8E+01	5.2E-02
p-Chloroaniline	1.5E+02	
Chlorobenzene	5.4E+02	
Chloroethane	2.1E+02	2.3E+01
Chloroform	2.3E+02	5.4E-01
Chloromethane	1.6E+02	
2-Chlorophenol	3.0E+01	
Chromium (total)		
Chromium III	5.5E+04	
Chromium VI	1.1E+02	
Chrysene	1.1E+03	9.2E+00
Cobalt	7.3E+02	
Copper	1.5E+04	
Cyanide	1.2E+02	
Dibenz(a,h)anthracene	1.1E+03	9.2E-03
Dibromochloromethane	7.3E+02	8.0E-01

**Lookup Table D-7. US EPA Region 9
Tap Water Goals
(µg/L)**

Chemical	Tap Water Goal (NonCarcinogenic Effects)	Tap Water Goal (Carcinogenic Effects)
1,2-dibromo-3-chloropropane		9.6E-03
1,2-Dibromoethane	1.8E+01	4.8E-03
1,2-Dichlorobenzene	3.7E+02	
1,3-Dichlorobenzene	1.8E+02	
1,4-Dichlorobenzene	6.6E+02	3.1E-01
3,3-Dichlorobenzidine		5.6E-02
Dichlorodipenyldichloroethane (DDD)	1.8E+01	2.8E-01
Dichlorodipenyldichloroethene (DDE)	1.8E+01	2.0E-01
Dichlorodiphenyltrichloroethane (DDT)	1.8E+01	2.0E-01
1,1-Dichloroethane	8.1E+02	2.0E+00
1,2-Dichloroethane	1.0E+01	1.2E-01
1,1-Dichloroethene	3.4E+02	
<i>cis</i> -1,2-Dichloroethene	6.1E+01	
<i>trans</i> -1,2-Dichloroethene	1.2E+02	
2,4-Dichlorophenol	1.1E+02	
1,2-Dichloropropane		2.8E-01
1,3-Dichloropropene	4.0E+01	1.8E-01
Dieldrin	1.8E+00	4.2E-03
Diethyl phthalate	2.9E+04	
Dimethyl phthalate	3.7E+05	
2,4-Dimethylphenol	7.3E+02	
2,4-Dinitrophenol	7.3E+02	
2,4-Dinitrotoluene	7.3E+01	9.9E-02
1,4-Dioxane		2.5E+00
Dioxin (2,3,7,8-TCDD)		5.2E-07
Endosulfan	2.2E+02	
Endrin	1.1E+01	
Ethylbenzene	1.3E+03	1.2E+00
Fluoranthene	1.5E+03	
Fluorene	2.4E+02	
Heptachlor	1.8E+01	1.5E-02
Heptachlor epoxide	4.7E-01	7.4E-03
Hexachlorobenzene	2.9E+01	4.2E-02
Hexachlorobutadiene	7.3E+00	8.6E-01
γ-Hexachlorocyclohexane (Lindane)	1.1E+01	
Hexachloroethane	3.7E+01	1.7E+00
Indeno(1,2,3-c,d)pyrene	1.1E+03	9.2E-02
Lead		
Mercury (elemental)	3.1E+00	
Methoxychlor		
Methylene chloride	6.0E+02	3.0E+00

**Lookup Table D-7. US EPA Region 9
Tap Water Goals
(µg/L)**

Chemical	Tap Water Goal (NonCarcinogenic Effects)	Tap Water Goal (Carcinogenic Effects)
Methyl ethyl ketone	7.1E+03	
Methyl isobutyl ketone	5.2E+03	
Methyl mercury	3.7E+00	
2-Methylnaphthalene	1.5E+02	
<i>tert</i> -Butyl methyl ether		1.2E+01
Molybdenum	1.8E+02	
Naphthalene	6.2E+00	#DIV/0!
Nickel	7.3E+02	
Pentachlorophenol	1.1E+02	5.6E-01
Perchlorate	2.6E+01	
Phenanthrene	1.8E+02	
Phenol	1.1E+04	
Polychlorinated biphenyls (PCBs)	7.3E-01	3.4E-02
Pyrene	2.2E+03	
Selenium	1.8E+02	
Silver	1.8E+02	
Styrene	1.5E+03	
<i>tert</i> -Butyl alcohol		
1,1,1,2-Tetrachloroethane	1.1E+03	4.2E-01
1,1,2,2-Tetrachloroethane	3.7E+02	5.5E-02
Tetrachloroethene	2.5E+02	1.0E-01
Thallium	2.9E+00	
Toluene	5.8E+02	
Toxaphene		5.6E-02
TPH (gasolines)	9.3E+01	
TPH (middle distillates)	9.3E+01	
TPH (residual fuels)	1.1E+03	
1,2,4-Trichlorobenzene	8.2E+00	1.9E+01
1,1,1-Trichloroethane	3.2E+03	
1,1,2-Trichloroethane	2.4E+01	1.9E-01
Trichloroethene	1.1E+01	1.4E+00
2,4,5-Trichlorophenol	6.1E+02	
2,4,6-Trichlorophenol	3.7E+00	6.1E+00
Vanadium	3.7E+01	
Vinyl chloride	7.2E+01	2.3E-02
Xylenes	2.0E+02	
Zinc	1.1E+04	

References:

Calculated using Tap Water equations in USEPA Region 9 Preliminary Remediation Goals document (USEPA 2004).

**Lookup Table D-7. US EPA Region 9
Tap Water Goals
(µg/L)**

Chemical	Tap Water Goal (NonCarcinogenic Effects)	Tap Water Goal (Carcinogenic Effects)
<p>Notes:</p> <p>Addresses use of water for drinking water and inhalation of volatile chemicals during showering.</p> <p>All water associated with the Snake River Plain Aquifer is considered to be a drinking water source.</p> <p>Tap Water value for TBA calculated using PRG methodology (not in PRGs).</p> <p>Target risk = 10^{-6}. Target HQ = 1. Adjusted to CalEPA CSFs. See Appendix 2 for equations.</p>		

Lookup Table E: Soil Cleanup Standard Values for Leaching Concerns

					Target Groundwater Concentrations		Soil Leaching Protection Values	
	Organic Carbon Coefficient (Koc)	Henry's Law Constant (H)	Dilution/Attenuation Factor (DAF)	Saturation Limit	Target Groundwater Concentration (Drinking Water Resource) (Table D-1)	Target Groundwater Concentration (NON-Drinking Water Resource) (Table D-2)	Soil Leaching protection value (Drinking Water Resource)	Soil Leaching protection value (NON-Drinking Water Resource)
Chemical	(cm ³ /g)	(atm·m ³ /mole·°K)		(mg/kg)	(µg/L)	(µg/L)	(mg/kg)	(mg/kg)
Acenaphthene	4.90E+03	1.55E-04	8.14E+02	1.3E+02	2.0E+01	2.3E+01	1.6E+01	1.9E+01
Acenaphthylene	2.50E+03	1.45E-03	4.24E+02	5.9E+01	3.0E+01	3.0E+01	1.3E+01	1.3E+01
Acetone	5.75E-01	3.88E-05	3.36E-01	1.0E+05	1.5E+03	1.5E+03	5.0E-01	5.0E-01
Aldrin	4.90E+04	4.96E-05	8.13E+03	5.0E+00	2.0E-03	1.3E-01	5.0E+00	5.0E+00
Anthracene	2.35E+04	6.50E-05	3.90E+03	6.1E+00	7.3E-01	7.3E-01	2.8E+00	2.8E+00
Antimony					6.0E+00	3.0E+01		
Arsenic					3.6E+01	3.6E+01		
Barium					1.0E+03	1.0E+03		
Benzene	5.90E+01	5.56E-03	4.43E+01	8.7E+02	1.0E+00	4.6E+01	4.4E-02	2.0E+00
Benzo(a)anthracene	2.00E+05	1.00E-06	3.32E+04	1.2E+01	2.7E-02	2.7E-02	1.2E+01	1.2E+01
Benzo(b)fluoranthene	5.50E+05	1.22E-05	9.13E+04	4.6E+01	2.9E-02	2.9E-02	4.6E+01	4.6E+01
Benzo(k)fluoranthene	5.50E+05	3.87E-05	9.13E+04	2.6E+00	2.9E-02	4.0E-01	2.7E+00	3.7E+01
Benzo(g,h,i)perylene	1.60E+06	1.44E-07	2.66E+05	2.5E+00	1.0E-01	1.0E-01	2.7E+01	2.7E+01
Benzo(a)pyrene	5.50E+06	4.90E-07	9.13E+05	1.3E+02	1.4E-02	1.4E-02	1.3E+02	1.3E+02
Beryllium					5.3E-01	5.3E-01		
1,1-Biphenyl	7.76E+03	3.00E-04	1.29E+03	3.5E+02	5.0E-01	5.0E+00	6.5E-01	6.5E+00
Bis(2-chloroethyl) ether	7.60E+01	1.80E-05	1.27E+01	9.6E+03	3.2E-02	1.2E+01	4.0E-04	1.6E-01
Bis(2-chloroisopropyl) ether	6.10E+01	1.13E-04	1.08E+01	7.9E+02	1.4E-02	1.2E+01	1.5E-04	1.3E-01
Bis(2-ethylhexyl) phthalate	1.00E+05	3.00E-07	1.66E+04	7.8E+02	4.0E+00	3.2E+01	7.8E+02	7.8E+02
Boron					1.6E+00	1.6E+00		
Bromodichloromethane	5.50E+01	1.60E-03	1.91E+01	3.0E+03	1.0E+02	1.7E+02	1.9E+00	3.2E+00
Bromoform (Tribromomethane)	1.10E+02	5.32E-04	2.16E+01	2.4E+03	1.0E+02	1.1E+03	2.2E+00	2.4E+01
Bromomethane	9.00E+00	6.24E-03	4.02E+01	3.1E+03	9.8E+00	1.6E+02	3.9E-01	6.4E+00
Cadmium					2.5E-01	2.5E-01		
Carbon tetrachloride	1.74E+02	3.04E-02	2.18E+02	1.1E+03	5.0E-01	9.3E+00	1.1E-01	2.0E+00
Chlordane	4.40E+04	4.79E-05	7.30E+03	1.5E+01	4.0E-03	4.0E-03	1.5E+01	1.5E+01

Lookup Table E: Soil Cleanup Standard Values for Leaching Concerns

					Target Groundwater Concentrations		Soil Leaching Protection Values	
	Organic Carbon Coefficient (Koc)	Henry's Law Constant (H)	Dilution/Attenuation Factor (DAF)	Saturation Limit	Target Groundwater Concentration (Drinking Water Resource) (Table D-1)	Target Groundwater Concentration (NON-Drinking Water Resource) (Table D-2)	Soil Leaching protection value (Drinking Water Resource)	Soil Leaching protection value (NON-Drinking Water Resource)
Chemical	(cm ³ /g)	(atm·m ³ /mole·°K)		(mg/kg)	(µg/L)	(µg/L)	(mg/kg)	(mg/kg)
p-Chloroaniline	6.40E+01	3.31E-07	1.06E+01	1.3E+03	5.0E+00	5.0E+00	5.3E-02	5.3E-02
Chlorobenzene	2.19E+02	3.70E-03	5.93E+01	6.8E+02	2.5E+01	2.5E+01	1.5E+00	1.5E+00
Chloroethane	1.47E+01	1.10E-02	7.07E+01	1.6E+03	1.2E+01	1.2E+01	8.5E-01	8.5E-01
Chloroform	3.98E+01	3.67E-03	2.94E+01	2.9E+03	7.0E+01	3.3E+02	2.1E+00	9.8E+00
Chloromethane	3.50E+01	2.40E-02	1.55E+02	4.1E+03	4.1E+01	4.1E+01	6.4E+00	6.4E+00
2-Chlorophenol	3.98E+02	3.91E-04	6.85E+01	5.5E+04	1.8E-01	1.8E+00	1.2E-02	1.2E-01
Chromium (total)					5.0E+01	1.8E+02		
Chromium III					1.8E+02	1.8E+02		
Chromium VI					1.1E+01	1.1E+01		
Chrysene	4.00E+05	9.46E-05	6.64E+04	3.8E+00	3.5E-01	3.5E-01	2.3E+01	2.3E+01
Cobalt					3.0E+00	3.0E+00		
Copper					3.1E+00	3.1E+00		
Cyanide	1.70E+01	1.30E-04	3.63E+00	2.0E+05	1.0E+00	1.0E+00	3.6E-03	3.6E-03
Dibenz(a,h)anthracene	3.30E+06	7.30E-08	5.48E+05	9.9E+00	4.8E-03	2.5E-01	9.9E+00	1.4E+02
Dibromochloromethane	4.68E+02	8.50E-04	8.30E+01	1.3E+04	1.0E+02	1.7E+02	8.3E+00	1.4E+01
1,2-dibromo-3-chloropropane	1.30E+02	1.47E-04	2.25E+01	1.1E+03	2.0E-01	2.0E-01	4.5E-03	4.5E-03
1,2-Dibromoethane	2.81E+01	3.20E-04	6.65E+00	9.2E+02	5.0E-02	1.5E+02	3.3E-04	1.0E+00
1,2-Dichlorobenzene	6.17E+02	1.90E-03	1.14E+02	6.0E+02	1.0E+01	1.4E+01	1.1E+00	1.6E+00
1,3-Dichlorobenzene	6.17E+02	1.90E-03	1.14E+02	6.0E+02	6.5E+01	6.5E+01	7.4E+00	7.4E+00
1,4-Dichlorobenzene	6.17E+02	2.43E-03	1.18E+02	2.8E+02	5.0E+00	1.5E+01	5.9E-01	1.8E+00
3,3-Dichlorobenzidine	1.60E+03	8.33E-07	2.66E+02	3.0E+01	2.9E-02	2.5E+02	7.7E-03	6.6E+01
Dichlorodiphenyldichloroethane (DDD)	7.80E+05	7.96E-06	1.29E+05	7.5E+02	1.0E-03	1.0E-03	7.5E+02	7.5E+02
Dichlorodiphenyldichloroethene (DDE)	4.40E+06	6.80E-05	7.30E+05	1.1E+03	1.0E-03	1.0E-03	1.1E+03	1.1E+03
Dichlorodiphenyltrichloroethane (DDT)	2.40E+05	3.89E-05	3.98E+04	4.3E+00	1.0E-03	1.0E-03	4.3E+00	4.3E+00
1,1-Dichloroethane	3.16E+01	5.62E-03	4.01E+01	1.7E+03	5.0E+00	4.7E+01	2.0E-01	1.9E+00
1,2-Dichloroethane	1.74E+01	9.79E-04	8.97E+00	1.8E+03	5.0E-01	2.0E+02	4.5E-03	1.8E+00

Lookup Table E: Soil Cleanup Standard Values for Leaching Concerns

					Target Groundwater Concentrations		Soil Leaching Protection Values	
	Organic Carbon Coefficient (Koc)	Henry's Law Constant (H)	Dilution/Attenuation Factor (DAF)	Saturation Limit	Target Groundwater Concentration (Drinking Water Resource) (Table D-1)	Target Groundwater Concentration (NON-Drinking Water Resource) (Table D-2)	Soil Leaching protection value (Drinking Water Resource)	Soil Leaching protection value (NON-Drinking Water Resource)
Chemical	(cm ³ /g)	(atm·m ³ /mole·°K)		(mg/kg)	(µg/L)	(µg/L)	(mg/kg)	(mg/kg)
1,1-Dichloroethene	5.89E+01	2.61E-02	1.72E+02	1.5E+03	6.0E+00	2.5E+01	1.0E+00	4.3E+00
<i>cis</i> -1,2-Dichloroethene	3.55E+01	4.08E-03	3.12E+01	1.2E+03	6.0E+00	5.9E+02	1.9E-01	1.8E+01
<i>trans</i> -1,2-Dichloroethene	5.25E+01	9.38E-03	6.69E+01	3.1E+03	1.0E+01	5.9E+02	6.7E-01	3.9E+01
2,4-Dichlorophenol	6.00E+03	2.80E-06	9.96E+02	1.6E+05	3.0E-01	3.0E+00	3.0E-01	3.0E+00
1,2-Dichloropropane	4.37E+01	2.80E-03	2.46E+01	1.1E+03	5.0E+00	1.0E+02	1.2E-01	2.5E+00
1,3-Dichloropropene	4.57E+01	1.77E-02	1.17E+02	1.4E+03	5.0E-01	2.4E+01	5.9E-02	2.9E+00
Dieldrin	7.40E+03	5.84E-05	1.23E+03	8.3E+00	1.9E-03	1.9E-03	2.3E-03	2.3E-03
Diethyl phthalate	1.40E+02	1.14E-06	2.32E+01	8.4E+02	1.5E+00	1.5E+00	3.5E-02	3.5E-02
Dimethyl phthalate	1.40E+02	1.05E-07	2.32E+01	4.7E+03	1.5E+00	1.5E+00	3.5E-02	3.5E-02
2,4-Dimethylphenol	4.00E+01	1.70E-05	6.75E+00	2.7E+03	1.0E+02	1.1E+02	6.7E-01	7.4E-01
2,4-Dinitrophenol	1.70E+01	6.45E-10	2.82E+00	1.1E+03	1.5E+01	1.5E+01	4.2E-02	4.2E-02
2,4-Dinitrotoluene	4.50E+01	4.50E-06	7.50E+00	1.0E+02	5.1E-02	1.2E+02	3.9E-04	8.6E-01
1,4-Dioxane	3.50E+00	3.00E-06	6.00E-01	1.2E+05	3.0E+00	5.0E+04	1.8E-03	3.0E+01
Dioxin (2,3,7,8-TCDD)	1.30E+07	8.10E-05		1.1E+06	1.0E-06	1.0E-06		
Endosulfan	3.20E+03	1.00E-05	5.31E+02	2.9E+00	8.7E-03	8.7E-03	4.6E-03	4.6E-03
Endrin	1.70E+03	7.51E-06	2.82E+02	2.7E+00	2.3E-03	2.3E-03	6.5E-04	6.5E-04
Ethylbenzene	3.63E+02	7.88E-03	1.09E+02	4.0E+02	3.0E+01	4.3E+01	3.3E+00	4.7E+00
Fluoranthene	3.80E+04	6.50E-06	6.31E+03	6.0E+01	8.0E+00	8.0E+00	6.0E+01	6.0E+01
Fluorene	1.38E+04	7.70E-05	2.29E+03	1.6E+02	3.9E+00	3.9E+00	8.9E+00	8.9E+00
Heptachlor	2.20E+04	1.48E-03	3.66E+03	7.4E+00	3.6E-03	3.6E-03	1.3E-02	1.3E-02
Heptachlor epoxide	2.30E+04	3.16E-05	3.82E+03	4.8E+01	3.6E-03	3.6E-03	1.4E-02	1.4E-02
Hexachlorobenzene	1.20E+06	1.70E-03	1.99E+05	7.9E+02	1.0E+00	3.7E+00	7.9E+02	7.9E+02
Hexachlorobutadiene	2.90E+04	2.56E-02	4.97E+03	3.5E+02	4.5E-01	9.3E-01	2.2E+00	4.6E+00
γ-Hexachlorocyclohexane (Lindane)	3.70E+03	4.93E-07	6.14E+02	1.6E+02	1.6E-02	1.6E-02	9.8E-03	9.8E-03
Hexachloroethane	2.00E+04	9.85E-03	3.38E+03	6.0E+03	9.0E-01	1.2E+01	3.0E+00	4.1E+01
Indeno(1,2,3-c,d)pyrene	1.60E+06	6.95E-08	2.66E+05	5.1E+00	4.8E-02	4.8E-02	1.3E+01	1.3E+01

Lookup Table E: Soil Cleanup Standard Values for Leaching Concerns

	Organic Carbon Coefficient (Koc)	Henry's Law Constant (H)	Dilution/Attenuation Factor (DAF)	Saturation Limit	Target Groundwater Concentrations		Soil Leaching Protection Values	
					Target Groundwater Concentration (Drinking Water Resource) (Table D-1)	Target Groundwater Concentration (NON-Drinking Water Resource) (Table D-2)	Soil Leaching protection value (Drinking Water Resource)	Soil Leaching protection value (NON-Drinking Water Resource)
Chemical	(cm ³ /g)	(atm·m ³ /mole·°K)		(mg/kg)	(µg/L)	(µg/L)	(mg/kg)	(mg/kg)
Lead					2.5E+00	2.5E+00		
Mercury (elemental)					2.5E-02	2.5E-02		
Methoxychlor	7.90E+04	1.58E-05	1.31E+04	1.9E+01	3.0E-03	3.0E-03	1.9E+01	1.9E+01
Methylene chloride	1.11E+01	2.19E-03	1.54E+01	2.4E+03	5.0E+00	2.2E+03	7.7E-02	3.4E+01
Methyl ethyl ketone	4.50E+00	2.74E-05	9.17E-01	3.4E+04	4.2E+03	1.4E+04	3.9E+00	1.3E+01
Methyl isobutyl ketone	1.34E+02	1.40E-04	2.31E+01	1.7E+04	1.2E+02	1.7E+02	2.8E+00	3.9E+00
Methyl mercury					3.0E-03	3.0E-03		
2-Methylnaphthalene	7.20E+02	2.90E-04	1.21E+02	1.1E+02	2.1E+00	2.1E+00	2.5E-01	2.5E-01
<i>tert</i> -Butyl methyl ether	6.00E+00	5.87E-04	4.64E+00	2.1E+04	5.0E+00	1.8E+03	2.3E-02	8.4E+00
Molybdenum					3.5E+01	2.4E+02		
Naphthalene	1.19E+03	4.83E-04	2.01E+02	2.2E+02	1.7E+01	2.4E+01	3.4E+00	4.8E+00
Nickel					8.2E+00	8.2E+00		
Pentachlorophenol	3.20E+04	2.80E-06	5.31E+03	2.7E+06	1.0E+00	7.9E+00	2.7E+06	2.7E+06
Perchlorate					6.0E+00	6.0E+02		
Phenanthrene	1.40E+04	3.93E-05	2.32E+03	6.9E+01	4.6E+00	4.6E+00	1.1E+01	1.1E+01
Phenol	9.10E+01	1.30E-06	1.51E+01	5.2E+04	5.0E+00	2.6E+02	7.6E-02	3.9E+00
Polychlorinated biphenyls (PCBs)	3.30E+04	5.20E-04	5.48E+03	6.3E+00	1.4E-02	1.4E-02	6.3E+00	6.3E+00
Pyrene	1.05E+05	1.10E-05	1.74E+04	8.5E+01	2.0E+00	2.0E+00	8.5E+01	8.5E+01
Selenium					5.0E+00	5.0E+00		
Silver					1.9E-01	1.9E-01		
Styrene	7.76E+02	2.75E-03	1.46E+02	1.5E+03	1.0E+01	1.0E+02	1.5E+00	1.5E+01
<i>tert</i> -Butyl alcohol	3.70E+01	1.17E-05	6.21E+00	3.2E+05	1.2E+01	1.8E+04	7.5E-02	1.1E+02
1,1,1,2-Tetrachloroethane	9.37E+01	3.45E-04	1.77E+01	2.0E+03	1.3E+00	9.3E+02	2.4E-02	1.6E+01
1,1,2,2-Tetrachloroethane	9.37E+01	3.45E-04	1.77E+01	2.0E+03	1.0E+00	1.9E+02	1.8E-02	3.4E+00
Tetrachloroethene	1.55E+02	1.84E-02	1.40E+02	2.3E+02	5.0E+00	1.2E+02	7.0E-01	1.7E+01
Thallium					2.0E+00	4.0E+00		

Lookup Table E: Soil Cleanup Standard Values for Leaching Concerns

					Target Groundwater Concentrations		Soil Leaching Protection Values	
	Organic Carbon Coefficient (Koc)	Henry's Law Constant (H)	Dilution/Attenuation Factor (DAF)	Saturation Limit	Target Groundwater Concentration (Drinking Water Resource) (Table D-1)	Target Groundwater Concentration (NON-Drinking Water Resource) (Table D-2)	Soil Leaching protection value (Drinking Water Resource)	Soil Leaching protection value (NON-Drinking Water Resource)
Chemical	(cm ³ /g)	(atm·m ³ /mole·°K)		(mg/kg)	(µg/L)	(µg/L)	(mg/kg)	(mg/kg)
Toluene	1.82E+02	6.64E-03	7.14E+01	6.5E+02	4.0E+01	1.3E+02	2.9E+00	9.3E+00
Toxaphene	4.90E+03	2.10E-01	2.12E+03	9.3E+01	2.0E-04	2.0E-04	4.2E-04	4.2E-04
TPH (gasolines)	5.00E+03	7.20E-04	8.34E+02	4.5E+03	1.0E+02	2.1E+02	8.3E+01	1.8E+02
TPH (middle distillates)	5.00E+03	7.20E-04	8.34E+02	1.5E+02	1.0E+02	2.1E+02	8.3E+01	1.8E+02
TPH (residual fuels)	5.00E+03			1.5E+02	1.0E+02	2.1E+02		
1,2,4-Trichlorobenzene	1.78E+03	1.42E-03	3.04E+02	3.2E+03	5.0E+00	2.5E+01	1.5E+00	7.6E+00
1,1,1-Trichloroethane	1.10E+02	1.72E-02	1.25E+02	1.2E+03	6.2E+01	6.2E+01	7.8E+00	7.8E+00
1,1,2-Trichloroethane	5.01E+01	9.13E-04	1.40E+01	1.8E+03	5.0E+00	3.5E+02	7.0E-02	4.8E+00
Trichloroethene	1.66E+02	1.03E-02	9.15E+01	1.3E+03	5.0E+00	3.6E+02	4.6E-01	3.3E+01
2,4,5-Trichlorophenol	8.90E+01	2.18E-04	1.61E+01	7.6E+02	1.1E+01	1.1E+01	1.8E-01	1.8E-01
2,4,6-Trichlorophenol	2.00E+03	4.00E-06	3.32E+02	9.7E+03	7.0E-01	9.7E+01	2.3E-01	3.2E+01
Vanadium					1.5E+01	1.9E+01		
Vinyl chloride	1.86E+01	2.70E-02	1.71E+02	1.2E+03	5.0E-01	3.8E+00	8.5E-02	6.6E-01
Xylenes	4.07E+02	7.34E-03	1.13E+02	4.2E+02	2.0E+01	1.0E+02	2.3E+00	1.1E+01
Zinc					8.1E+01	8.1E+01		

Notes:

Soil leaching equation from Ontario MOEE guidance (see text).

Groundwater Category Drinking Water Resource - protective of groundwater that is a source of drinking water AND protective of discharge of groundwater to a surface water and subsequent impact on aquatic life.

Groundwater Category NON-Drinking Water Resource - protective of discharge of impacted groundwater to surface water and subsequent impact on aquatic life.

#: Leaching model used considered to be excessively conservative for highly sorptive chemicals. For chemicals with koc values greater than 30,000 cm³/g,

theoretical soil saturation level ("sat") used in place of leaching model protection value if higher (see text). Soil saturation levels calculated using equation presented in USEPA Region 9 PRG guidance (USEPA 2004, see Appendix 2). Exceptions include bis(2-ethylhexyl)phthalate and pentachlorophenol (see text).

TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.

Physical-Chemical constants for chemicals from USEPA Region 9 (USEPA 2004) or Ontario MOEE (MOEE 1996) when not available unless otherwise noted (see also Table J).

Physical-Chemical constants for TPH (gasolines and middle distillates) based on constants developed for C11 to C22 aromatic carbon range fraction by Massachusetts DEP

Lookup Table E: Soil Cleanup Standard Values for Leaching Concerns

					Target Groundwater Concentrations		Soil Leaching Protection Values	
	Organic Carbon Coefficient (Koc)	Henry's Law Constant (H)	Dilution/Attenuation Factor (DAF)	Saturation Limit	Target Groundwater Concentration (Drinking Water Resource) (Table D-1)	Target Groundwater Concentration (NON-Drinking Water Resource) (Table D-2)	Soil Leaching protection value (Drinking Water Resource)	Soil Leaching protection value (NON-Drinking Water Resource)
Chemical	(cm ³ /g)	(atm-m ³ /mole-°K)		(mg/kg)	(µg/L)	(µg/L)	(mg/kg)	(mg/kg)

and used to develop RBSLs for leaching of TPH in general from soil (MADEP 1997). Soil leaching level rounded to nearest hundred.

Target groundwater concentrations from Table F-1a and F-1b.

Target groundwater concentration and corresponding soil leaching levels for TPH based on criteria in Board Order 99-045 for San Francisco Airport (RWQCBSF, 1999).

Cleanup standard values for TPH (gasolines) and TPH (middle distillates) rounded to nearest 100 mg/kg.

TPH (residual fuels) cleanup standard value for leaching from California Regional Water Board, Region 4 - drinking water protection, C23-C32 carbon range (RWQCBLA 1996).

Cleanup standard values for perchlorate calculated using leaching equation in USEPA Soil Screening Guidance and assumed Dilution/Attenuation Factor of 20 (see text).

All water associated with the Snake River Plain Aquifer is considered to be a drinking water source.

**Lookup Table F-1. Criteria for Assignment
of Soil Gross Contamination Ceiling Levels**

Soil Category	Criteria	Gross Contamination Ceiling Level (mg/kg)
Surface Soils		
Unrestricted	Odor Index \geq 100 OR no Odor Index and Vapor Pressure \geq 1 Torr OR no data	100
	0.1 \leq Odor Index < 100 OR no Odor Index and Vapor Pressure < 1 Torr	500
	Odor Index < 0.1 OR non-odorous chemical	1000
Industrial/Commercial	Odor Index \geq 100 OR no Odor Index and Vapor Pressure \geq 1 Torr OR no data	500
	0.1 \leq Odor Index < 100 OR no Odor Index and Vapor Pressure < 1 Torr	1000
	Odor Index < 0.1 OR non-odorous chemical	2500
Subsurface Soils		
Unrestricted	Odor Index \geq 100 OR no Odor Index and Vapor Pressure \geq 1 Torr OR no data	500
	0.1 \leq Odor Index < 100 OR no Odor Index and Vapor Pressure < 1 Torr	1000
	Odor Index < 0.1 OR non-odorous chemical	2500
Industrial/Commercial	Odor Index \geq 100 OR no Odor Index and Vapor Pressure \geq 1 Torr OR no data	1000
	0.1 \leq Odor Index < 100 OR no Odor Index and Vapor Pressure < 1 Torr	2500
	Odor Index < 0.1 OR non-odorous chemical	5000
Modified from Ontario Ministry of Environment and Energy (MOEE 1996) and Massachusetts Department of Environmental Protection (MADEP 1994).		

**Lookup Table F-2. Components for Shallow Soil Gross Contamination Ceiling Levels
(mg/kg)**

Chemical	¹Unrestricted Gross Contamination Ceiling Level	Industrial/ Commercial Gross Contamination Ceiling Level	Soil Saturation Limit (mg/kg)	Vapor Pressure (VP) (Torr @ 20-30 °C)	50 Percentile Odor Recognition Threshold (ORT) (µg/m³)	50 Percentile Odor Recognition Threshold (ORT) (ppmv)	Odor Index
Acenaphthene	1.0E+03	2.5E+03	N/A	4.50E-03	5.13E+02	8.00E-02	5.63E-02
Acenaphthylene	5.0E+02	1.0E+03	N/A	2.90E-02	-	-	-
Acetone	5.0E+02	1.0E+03	1.0E+05	2.70E+02	3.09E+04	1.30E+01	2.08E+01
Aldrin	1.0E+03	2.5E+03	N/A	2.30E-05	2.63E+02	1.70E-02	1.35E-03
Anthracene	5.0E+02	1.0E+03	N/A	1.70E-05	-	-	-
Antimony	1.0E+03	2.5E+03	N/A	-	-	-	-
Arsenic	1.0E+03	2.5E+03	N/A	-	-	-	-
Barium	1.0E+03	2.5E+03	N/A	-	-	-	-
Benzene	5.0E+02	8.7E+02	8.7E+02	9.50E+01	4.89E+03	1.50E+00	6.33E+01
Benzo(a)anthracene	5.0E+02	1.0E+03	N/A	2.20E-08	-	-	-
Benzo(b)fluoranthene	5.0E+02	1.0E+03	N/A	5.00E-07	-	-	-
Benzo(k)fluoranthene	5.0E+02	1.0E+03	N/A	9.60E-11	-	-	-
Benzo(g,h,i)perylene	5.0E+02	1.0E+03	N/A	1.10E-10	-	-	-
Benzo(a)pyrene	5.0E+02	1.0E+03	N/A	5.60E-09	-	-	-
Beryllium	1.0E+03	2.5E+03	N/A	-	-	-	-
1,1-Biphenyl	5.0E+02	1.0E+03	N/A	5.00E-03	6.00E+01	9.50E-03	5.26E-01
Bis(2-chloroethyl) ether	5.0E+02	1.0E+03	9.6E+03	7.10E-01	2.87E+02	4.90E-02	1.45E+01
Bis(2-chloroisopropyl) ether	5.0E+02	7.9E+02	7.9E+02	8.50E-01	2.24E+03	3.20E-01	2.66E+00
Bis(2-ethylhexyl) phthalate	5.0E+02	1.0E+03	N/A	6.20E-08	-	-	-
Boron	no criteria	no critiera	N/A	-	-	-	-
Bromodichloromethane	1.0E+03	2.5E+03	3.0E+03	5.00E+01	1.10E+07	1.68E+03	2.98E-02
Bromoform (Tribromomethane)	5.0E+02	1.0E+03	N/A	5.60E+00	1.35E+04	1.30E+00	4.31E+00
Bromomethane	5.0E+02	1.0E+03	3.1E+03	1.42E+03	8.00E+04	2.00E+01	7.10E+01
Cadmium	1.0E+03	2.5E+03	N/A	-	-	-	-
Carbon tetrachloride	5.0E+02	1.0E+03	1.1E+03	1.13E+02	6.30E+04	1.00E+01	1.13E+01
Chlordane	1.0E+03	2.5E+03	N/A	1.00E-05	8.40E+00	4.92E-04	2.03E-02
p-Chloroaniline	1.0E+03	2.5E+03	N/A	1.00E-05	-	-	-

**Lookup Table F-2. Components for Shallow Soil Gross Contamination Ceiling Levels
(mg/kg)**

Chemical	¹Unrestricted Gross Contamination Ceiling Level	Industrial/ Commercial Gross Contamination Ceiling Level	Soil Saturation Limit (mg/kg)	Vapor Pressure (VP) (Torr @ 20-30 °C)	50 Percentile Odor Recognition Threshold (ORT) (µg/m³)	50 Percentile Odor Recognition Threshold (ORT) (ppmv)	Odor Index
Chlorobenzene	5.0E+02	6.8E+02	6.8E+02	1.18E+01	1.00E+03	2.20E-01	5.36E+01
Chloroethane	5.0E+02	1.0E+03	1.6E+03	1.01E+03	3.80E+05	1.40E+02	7.20E+00
Chloroform	5.0E+02	1.0E+03	2.9E+03	1.60E+02	4.22E+05	8.50E+01	1.88E+00
Chloromethane	1.0E+02	5.0E+02	4.1E+03	4.30E+03	-	-	-
2-Chlorophenol	1.0E+02	5.0E+02	5.5E+04	1.42E+00	1.90E+01	3.60E-03	3.94E+02
Chromium (total)	1.0E+03	2.5E+03	N/A	-	-	-	-
Chromium III	1.0E+03	2.5E+03	N/A	-	-	-	-
Chromium VI	1.0E+03	2.5E+03	N/A	-	-	-	-
Chrysene	1.0E+03	2.5E+03	N/A	6.30E-07	-	-	-
Cobalt	1.0E+03	2.5E+03	N/A	-	-	-	-
Copper	1.0E+03	2.5E+03	N/A	-	-	-	-
Cyanide	1.0E+02	5.0E+02	N/A	6.20E+02	6.52E+02	5.80E-01	1.07E+03
Dibenz(a,h)anthracene	5.0E+02	1.0E+03	N/A	1.00E-10	-	-	-
Dibromochloromethane	1.0E+02	5.0E+02	N/A	7.60E+01	-	-	-
1,2-dibromo-3-chloropropane	5.0E+02	1.0E+03	N/A	8.00E-01	-	-	-
1,2-Dibromoethane	5.0E+02	1.0E+03	N/A	1.20E+01	2.00E+05	2.60E+01	4.62E-01
1,2-Dichlorobenzene	6.0E+02	6.0E+02	6.0E+02	1.50E+00	3.05E+05	5.00E+01	3.00E-02
1,3-Dichlorobenzene	1.0E+02	6.0E+02	6.0E+02	2.30E+00	-	-	-
1,4-Dichlorobenzene	5.0E+02	1.0E+03	N/A	1.80E+00	1.10E+03	1.80E-01	1.00E+01
3,3-Dichlorobenzidine	5.0E+02	1.0E+03	N/A	4.50E-09	-	-	-
Dichlorodiphenyldichloroethane (DDT)	5.0E+02	1.0E+03	N/A	1.00E-06	-	-	-
Dichlorodiphenyldichloroethene (DDE)	5.0E+02	1.0E+03	N/A	6.50E-06	-	-	-
Dichlorodiphenyltrichloroethane (DDT)	1.0E+03	2.5E+03	N/A	5.50E-06	-	-	-
1,1-Dichloroethane	5.0E+02	1.0E+03	1.7E+03	2.34E+02	1.25E+05	3.00E+01	7.80E+00
1,2-Dichloroethane	5.0E+02	1.0E+03	1.8E+03	7.90E+01	2.42E+03	5.90E-01	1.34E+02
1,1-Dichloroethene	5.0E+02	1.0E+03	1.5E+03	5.91E+02	2.00E+06	5.00E+02	1.18E+00
cis-1,2-Dichloroethene	1.0E+02	5.0E+02	1.2E+03	2.15E+02	-	-	-

**Lookup Table F-2. Components for Shallow Soil Gross Contamination Ceiling Levels
(mg/kg)**

Chemical	¹Unrestricted Gross Contamination Ceiling Level	Industrial/ Commercial Gross Contamination Ceiling Level	Soil Saturation Limit (mg/kg)	Vapor Pressure (VP) (Torr @ 20-30 °C)	50 Percentile Odor Recognition Threshold (ORT) (µg/m³)	50 Percentile Odor Recognition Threshold (ORT) (ppmv)	Odor Index
<i>trans</i> -1,2-Dichloroethene	5.0E+02	1.0E+03	3.1E+03	3.31E+02	6.73E+04	1.70E+01	1.95E+01
2,4-Dichlorophenol	5.0E+02	1.0E+03	N/A	6.70E-02	1.40E+03	2.10E-01	3.19E-01
1,2-Dichloropropane	1.0E+02	5.0E+02	1.1E+03	4.20E+01	1.19E+03	2.50E-01	1.68E+02
1,3-Dichloropropene	5.0E+02	1.0E+03	1.4E+03	4.30E+01	4.16E+03	1.00E+00	4.30E+01
Dieldrin	1.0E+03	2.5E+03	N/A	1.80E-08	-	-	-
Diethyl phthalate	5.0E+02	1.0E+03	N/A	3.50E-04	-	-	-
Dimethyl phthalate	5.0E+02	1.0E+03	N/A	1.70E-03	-	-	-
2,4-Dimethylphenol	1.0E+02	5.0E+02	N/A	9.80E-02	1.00E+00	1.97E-04	4.97E+02
2,4-Dinitrophenol	5.0E+02	1.0E+03	N/A	1.50E-05	-	-	-
2,4-Dinitrotoluene	5.0E+02	1.0E+03	N/A	5.10E-03	-	-	-
1,4-Dioxane	5.0E+02	1.0E+03	N/A	3.70E+01	6.12E+05	1.70E+02	2.18E-01
Dioxin (2,3,7,8-TCDD)	no criteria	no criteria	N/A	-	-	-	-
Endosulfan	5.0E+02	1.0E+03	N/A	1.00E-05	-	-	-
Endrin	5.0E+02	1.0E+03	N/A	2.00E-07	-	-	-
Ethylbenzene	4.0E+02	4.0E+02	4.0E+02	1.00E+01	2.00E+03	4.50E-01	2.22E+01
Fluoranthene	5.0E+02	1.0E+03	N/A	5.00E-06	-	-	-
Fluorene	5.0E+02	1.0E+03	N/A	3.20E-04	-	-	-
Heptachlor	1.0E+03	2.5E+03	N/A	3.00E-04	3.00E+02	2.00E-02	1.50E-02
Heptachlor epoxide	1.0E+03	2.5E+03	N/A	2.60E-06	3.00E+02	1.90E-02	1.37E-04
Hexachlorobenzene	5.0E+02	1.0E+03	N/A	1.10E-05	-	-	-
Hexachlorobutadiene	5.0E+02	1.0E+03	N/A	1.50E-01	1.20E+04	1.10E+00	1.36E-01
γ-Hexachlorocyclohexane (Lindane)	5.0E+02	1.0E+03	N/A	9.40E-06	-	-	-
Hexachloroethane	5.0E+02	1.0E+03	N/A	2.10E-01	-	-	-
Indeno(1,2,3-c,d)pyrene	5.0E+02	1.0E+03	N/A	1.00E-06	-	-	-
Lead	1.0E+03	2.5E+03	N/A	-	-	-	-
Mercury (elemental)	5.0E+02	1.0E+03	N/A	2.00E-03	-	-	-
Methoxychlor	5.0E+02	1.0E+03	N/A	1.40E-06	-	-	-

**Lookup Table F-2. Components for Shallow Soil Gross Contamination Ceiling Levels
(mg/kg)**

Chemical	¹Unrestricted Gross Contamination Ceiling Level	Industrial/ Commercial Gross Contamination Ceiling Level	Soil Saturation Limit (mg/kg)	Vapor Pressure (VP) (Torr @ 20-30 °C)	50 Percentile Odor Recognition Threshold (ORT) (µg/m³)	50 Percentile Odor Recognition Threshold (ORT) (ppmv)	Odor Index
Methylene chloride	5.0E+02	1.0E+03	2.4E+03	4.29E+02	5.60E+05	1.60E+02	2.68E+00
Methyl ethyl ketone	5.0E+02	1.0E+03	3.4E+04	1.00E+02	3.20E+04	1.10E+01	9.09E+00
Methyl isobutyl ketone	1.0E+02	5.0E+02	1.7E+04	1.00E+01	4.20E+02	1.00E-01	1.00E+02
Methyl mercury	1.0E+02	5.0E+02	N/A	-	-	-	-
2-Methylnaphthalene	5.0E+02	1.0E+03	N/A	6.80E-02	6.80E+01	1.15E-02	5.91E+00
<i>tert</i> -Butyl methyl ether	1.0E+02	5.0E+02	2.1E+04	2.45E+02	5.30E+02	1.30E-01	1.88E+03
Molybdenum	1.0E+03	2.5E+03	N/A	-	-	-	-
Naphthalene	5.0E+02	1.0E+03	N/A	8.20E-02	4.40E+02	8.40E-02	9.76E-01
Nickel	1.0E+03	2.5E+03	N/A	-	-	-	-
Pentachlorophenol	5.0E+02	1.0E+03	N/A	1.10E-04	-	-	-
Perchlorate	1.0E+03	2.5E+03	N/A	-	-	-	-
Phenanthrene	5.0E+02	1.0E+03	N/A	9.60E-04	5.50E+01	7.42E-03	1.29E-01
Phenol	5.0E+02	1.0E+03	N/A	3.50E-01	1.56E+02	4.00E-02	8.75E+00
Polychlorinated biphenyls (PCBs)	5.0E+02	1.0E+03	N/A	4.9E-04 to 6.7E-03	-	-	-
Pyrene	5.0E+02	1.0E+03	N/A	2.50E-06	-	-	-
Selenium	1.0E+03	2.5E+03	N/A	-	-	-	-
Silver	1.0E+03	2.5E+03	N/A	-	-	-	-
Styrene	5.0E+02	1.0E+03	1.5E+03	5.00E+00	1.36E+03	3.00E-01	1.67E+01
<i>tert</i> -Butyl alcohol	1.0E+02	5.0E+02	3.2E+05	4.20E+01	-	-	-
1,1,1,2-Tetrachloroethane	1.0E+02	5.0E+02	2.0E+03	1.20E+01	-	-	-
1,1,1,2,2-Tetrachloroethane	5.0E+02	1.0E+03	2.0E+03	4.00E+00	1.05E+04	1.50E+00	2.67E+00
Tetrachloroethene	2.3E+02	2.3E+02	2.3E+02	1.90E+01	3.17E+04	4.68E+00	4.06E+00
Thallium	1.0E+03	2.5E+03	N/A	-	-	-	-
Toluene	5.0E+02	6.5E+02	6.5E+02	2.80E+01	3.00E+04	8.00E+00	3.50E+00
Toxaphene	5.0E+02	1.0E+03	N/A	4.00E-01	-	-	-
TPH (gasolines)	1.0E+02	5.0E+02	4.5E+03	3.00E+02	1.00E+02	2.20E-02	1.36E+04
TPH (middle distillates)	1.0E+02	5.0E+02	N/A	5.00E+00	1.00E+03	1.41E-02	3.55E+02

**Lookup Table F-2. Components for Shallow Soil Gross Contamination Ceiling Levels
(mg/kg)**

Chemical	¹Unrestricted Gross Contamination Ceiling Level	Industrial/ Commercial Gross Contamination Ceiling Level	Soil Saturation Limit (mg/kg)	Vapor Pressure (VP) (Torr @ 20-30 °C)	50 Percentile Odor Recognition Threshold (ORT) (µg/m³)	50 Percentile Odor Recognition Threshold (ORT) (ppmv)	Odor Index
TPH (residual fuels)	5.0E+02	2.5E+03	N/A	-	-	-	-
1,2,4-Trichlorobenzene	5.0E+02	1.0E+03	N/A	2.90E-01	2.20E+04	2.96E+00	9.80E-02
1,1,1-Trichloroethane	5.0E+02	1.0E+03	1.2E+03	1.00E+02	6.51E+04	1.20E+01	8.33E+00
1,1,2-Trichloroethane	1.0E+02	5.0E+02	1.8E+03	2.25E+01	-	-	-
Trichloroethene	5.0E+02	8.2E+02	1.3E+03	7.70E+01	1.36E+06	2.49E+02	3.09E-01
2,4,5-Trichlorophenol	1.0E+02	5.0E+02	N/A	-	-	-	-
2,4,6-Trichlorophenol	5.0E+02	1.0E+03	N/A	1.20E-02	3.00E-01	3.60E-05	3.33E+02
Vanadium	1.0E+03	2.5E+03	N/A	-	-	-	-
Vinyl chloride	5.0E+02	1.0E+03	1.2E+03	2.58E+03	7.71E+05	2.94E+02	8.78E+00
Xylenes	4.2E+02	4.2E+02	4.2E+02	6.00E+00	4.41E+02	1.00E-01	6.00E+01
Zinc	1.0E+03	2.5E+03	N/A	-	-	-	-

Notes:

1. "Residential Land Use" cleanup standard values generally considered adequate for other sensitive uses (e.g., day-care centers, hospitals, etc.).

Odor Index = VP/ORT in ppmv

Physical-chemical constants Ontario MOEE (MOEE 1996) except as noted.

Physical-chemical constants for chloroethane and chloromethane from ATSDR Toxicological Profiles (ATSDR 2001).

Odor Recognition Threshold in parts per million by volume (ppmv = (concentration in mg/m³) x (24/molecular weight)).

TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.

Ceiling Level: Based on comparison of vapor pressure and odor index to Table H-1 or saturation limit, if lower.

Saturation limits calculated using equation in USEPA Region 9 PRG guidance (for chemicals that are liquid at ambient temperatures and pressures; refer to Appendix 2).

Odor Threshold for ethanol of 10 ppmv from U.S. Coast Guard Chemical Hazards Response Information System (USCG 1999).

Odor Threshold of 0.13 ppmv for MtBE from information in CaEPA Public Health Goal for MtBE (CaEPA 1999).

TPH VP values from NIOSH (2005); ORT values from ATSDR (2001).

Ceiling Levels for TPH after guidance from Massachusetts Department of Environmental Protection (MADEP 1997a). Adjust as needed in field.

References for vapor pressure and odor threshold data (in order of use):

1. Ontario Ministry of Environment and Energy (MOEE 1996).

2. Massachusetts Department of Environmental Protection (MADEP 1994).

**Lookup Table F-2. Components for Shallow Soil Gross Contamination Ceiling Levels
(mg/kg)**

Chemical	¹ Unrestricted Gross Contamination Ceiling Level	Industrial/ Commercial Gross Contamination Ceiling Level	Soil Saturation Limit (mg/kg)	Vapor Pressure (VP) (Torr @ 20-30 °C)	50 Percentile Odor Recognition Threshold (ORT) (µg/m ³)	50 Percentile Odor Recognition Threshold (ORT) (ppmv)	Odor Index
<p>3. Agency for Toxic Substances and Disease Registry (ATSDR 2001).</p> <p>4. Vapor Pressure for 1,4 Dioxane from "Solvent Stabilizers - White Paper" (Mohr 2001). Odor Threshold from US Department of Health and Human Services, National Toxicology Program (USDHHS, 2001).</p> <p>All water associated with the Snake River Plain Aquifer is considered to be a drinking water source.</p>							

**Lookup Table F-3. Components for Deep Soil Gross Contamination Ceiling Levels
(mg/kg)**

Chemical	¹Unrestricted Gross Contamination Ceiling Level	Industrial/ Commercial Gross Contamination Ceiling Level	Soil Saturation Limit (mg/kg)	Vapor Pressure (VP) (Torr @ 20-30 °C)	50 Percentile Odor Recognition Threshold (ORT) (µg/m³)	50 Percentile Odor Recognition Threshold (ORT) (ppmv)	Odor Index
Acenaphthene	2.5E+03	5.0E+03	N/A	4.5E-03	5.13E+02	8.00E-02	5.63E-02
Acenaphthylene	1.0E+03	2.5E+03	N/A	2.9E-02	-	-	-
Acetone	1.0E+03	2.5E+03	1.0E+05	2.70E+02	3.09E+04	1.30E+01	2.08E+01
Aldrin	2.5E+03	5.0E+03	N/A	2.3E-05	2.63E+02	1.70E-02	1.35E-03
Anthracene	1.0E+03	2.5E+03	N/A	1.7E-05	-	-	-
Antimony	2.5E+03	5.0E+03	N/A	-	-	-	-
Arsenic	2.5E+03	5.0E+03	N/A	-	-	-	-
Barium	2.5E+03	5.0E+03	N/A	-	-	-	-
Benzene	8.7E+02	8.7E+02	8.7E+02	9.50E+01	4.89E+03	1.50E+00	6.33E+01
Benzo(a)anthracene	1.0E+03	2.5E+03	N/A	2.2E-08	-	-	-
Benzo(b)fluoranthene	1.0E+03	2.5E+03	N/A	5.0E-07	-	-	-
Benzo(k)fluoranthene	1.0E+03	2.5E+03	N/A	9.6E-11	-	-	-
Benzo(g,h,i)perylene	1.0E+03	2.5E+03	N/A	1.1E-10	-	-	-
Benzo(a)pyrene	1.0E+03	2.5E+03	N/A	5.6E-09	-	-	-
Beryllium	2.5E+03	5.0E+03	N/A	-	-	-	-
1,1-Biphenyl	1.0E+03	2.5E+03	N/A	5.00E-03	6.00E+01	9.50E-03	5.26E-01
Bis(2-chloroethyl) ether	1.0E+03	2.5E+03	9.6E+03	7.1E-01	2.87E+02	4.9E-02	1.45E+01
Bis(2-chloroisopropyl) ether	7.9E+02	7.9E+02	7.9E+02	8.5E-01	2.24E+03	3.20E-01	2.66E+00
Bis(2-ethylhexyl) phthalate	1.0E+03	2.5E+03	N/A	6.2E-08	-	-	-
Boron	no criteria	no criteria	N/A	-	-	-	-
Bromodichloromethane	2.5E+03	4.8E+03	3.0E+03	5.00E+01	1.10E+07	1.68E+03	2.98E-02
Bromoform (Tribromomethane)	1.0E+03	2.5E+03	N/A	5.60E+00	1.35E+04	1.30E+00	4.31E+00
Bromomethane	1.0E+03	2.5E+03	3.1E+03	1.42E+03	8.00E+04	2.00E+01	7.10E+01
Cadmium	2.5E+03	5.0E+03	N/A	-	-	-	-
Carbon tetrachloride	1.0E+03	1.1E+03	1.1E+03	1.13E+02	6.30E+04	1.00E+01	1.13E+01
Chlordane	2.5E+03	5.0E+03	N/A	1.0E-05	8.40E+00	4.92E-04	2.03E-02
p-Chloroaniline	2.5E+03	5.0E+03	N/A	1.0E-05	-	-	-
Chlorobenzene	6.8E+02	6.8E+02	6.8E+02	1.18E+01	1.00E+03	2.20E-01	5.36E+01
Chloroethane	1.0E+03	1.6E+03	1.6E+03	1.01E+03	3.80E+05	1.40E+02	7.20E+00

**Lookup Table F-3. Components for Deep Soil Gross Contamination Ceiling Levels
(mg/kg)**

Chemical	¹Unrestricted Gross Contamination Ceiling Level	Industrial/ Commercial Gross Contamination Ceiling Level	Soil Saturation Limit (mg/kg)	Vapor Pressure (VP) (Torr @ 20-30 °C)	50 Percentile Odor Recognition Threshold (ORT) (µg/m³)	50 Percentile Odor Recognition Threshold (ORT) (ppmv)	Odor Index
Chloroform	1.0E+03	2.5E+03	2.9E+03	1.60E+02	4.22E+05	8.50E+01	1.88E+00
Chloromethane	5.0E+02	1.0E+03	4.1E+03	4.30E+03	-	-	-
2-Chlorophenol	5.0E+02	1.0E+03	5.5E+04	1.42E+00	1.90E+01	3.60E-03	3.94E+02
Chromium (total)	2.5E+03	5.0E+03	N/A	-	-	-	-
Chromium III	2.5E+03	5.0E+03	N/A	-	-	-	-
Chromium VI	2.5E+03	5.0E+03	N/A	-	-	-	-
Chrysene	2.5E+03	5.0E+03	N/A	6.3E-07	-	-	-
Cobalt	2.5E+03	5.0E+03	N/A	-	-	-	-
Copper	2.5E+03	5.0E+03	N/A	-	-	-	-
Cyanide	5.0E+02	1.0E+03	N/A	6.20E+02	6.52E+02	5.80E-01	1.07E+03
Dibenz(a,h)anthracene	1.0E+03	2.5E+03	N/A	1.0E-10	-	-	-
Dibromochloromethane	5.0E+02	1.0E+03	N/A	7.60E+01	-	-	-
1,2-dibromo-3-chloropropane	1.0E+03	1.1E+03	N/A	8.00E-01	-	-	-
1,2-Dibromoethane	1.0E+03	2.5E+03	N/A	1.20E+01	2.00E+05	2.60E+01	4.62E-01
1,2-Dichlorobenzene	6.0E+02	6.0E+02	6.0E+02	1.50E+00	3.05E+05	5.00E+01	3.00E-02
1,3-Dichlorobenzene	6.0E+02	6.0E+02	6.0E+02	2.30E+00	-	-	-
1,4-Dichlorobenzene	1.0E+03	2.5E+03	N/A	1.80E+00	1.10E+03	1.80E-01	1.00E+01
3,3-Dichlorobenzidine	1.0E+03	2.5E+03	N/A	4.5E-09	-	-	-
Dichlorodiphenyldichloroethane (DDD)	1.0E+03	2.5E+03	N/A	1.0E-06	-	-	-
Dichlorodiphenyldichloroethene (DDE)	1.0E+03	2.5E+03	N/A	6.5E-06	-	-	-
Dichlorodiphenyltrichloroethane (DDT)	2.5E+03	5.0E+03	N/A	5.5E-06	-	-	-
1,1-Dichloroethane	1.0E+03	1.7E+03	1.7E+03	2.34E+02	1.25E+05	3.00E+01	7.80E+00
1,2-Dichloroethane	1.0E+03	1.8E+03	1.8E+03	7.90E+01	2.42E+03	5.90E-01	1.34E+02
1,1-Dichloroethene	1.0E+03	1.5E+03	1.5E+03	5.91E+02	2.00E+06	5.00E+02	1.18E+00
<i>cis</i> -1,2-Dichloroethene	5.0E+02	1.0E+03	1.2E+03	2.15E+02	-	-	-
<i>trans</i> -1,2-Dichloroethene	1.0E+03	2.5E+03	3.1E+03	3.31E+02	6.73E+04	1.70E+01	1.95E+01
2,4-Dichlorophenol	1.0E+03	2.5E+03	N/A	6.7E-02	1.40E+03	2.10E-01	3.19E-01
1,2-Dichloropropane	5.0E+02	1.0E+03	1.1E+03	4.20E+01	1.19E+03	2.50E-01	1.68E+02

**Lookup Table F-3. Components for Deep Soil Gross Contamination Ceiling Levels
(mg/kg)**

Chemical	¹Unrestricted Gross Contamination Ceiling Level	Industrial/ Commercial Gross Contamination Ceiling Level	Soil Saturation Limit (mg/kg)	Vapor Pressure (VP) (Torr @ 20-30 °C)	50 Percentile Odor Recognition Threshold (ORT) (µg/m³)	50 Percentile Odor Recognition Threshold (ORT) (ppmv)	Odor Index
1,3-Dichloropropene	1.0E+03	1.4E+03	1.4E+03	4.30E+01	4.16E+03	1.00E+00	4.30E+01
Dieldrin	2.5E+03	5.0E+03	N/A	1.8E-08	-	-	-
Diethyl phthalate	1.0E+03	2.5E+03	N/A	3.5E-04	-	-	-
Dimethyl phthalate	1.0E+03	2.5E+03	N/A	1.7E-03	-	-	-
2,4-Dimethylphenol	5.0E+02	1.0E+03	N/A	9.8E-02	1.00E+00	1.97E-04	4.97E+02
2,4-Dinitrophenol	1.0E+03	2.5E+03	N/A	1.5E-05	-	-	-
2,4-Dinitrotoluene	1.0E+03	2.5E+03	N/A	5.1E-03	-	-	-
1,4-Dioxane	1.0E+03	2.5E+03	N/A	3.70E+01	6.12E+05	1.70E+02	2.18E-01
Dioxin (2,3,7,8-TCDD)	no criteria	no criteria	N/A	-	-	-	-
Endosulfan	1.0E+03	2.5E+03	N/A	1.0E-05	-	-	-
Endrin	1.0E+03	2.5E+03	N/A	2.0E-07	-	-	-
Ethylbenzene	4.0E+02	4.0E+02	4.0E+02	1.00E+01	2.00E+03	4.50E-01	2.22E+01
Fluoranthene	1.0E+03	2.5E+03	N/A	5.0E-06	-	-	-
Fluorene	1.0E+03	2.5E+03	N/A	3.2E-04	-	-	-
Heptachlor	2.5E+03	5.0E+03	N/A	3.0E-04	3.00E+02	2.00E-02	1.50E-02
Heptachlor epoxide	2.5E+03	5.0E+03	N/A	2.6E-06	3.00E+02	1.90E-02	1.37E-04
Hexachlorobenzene	1.0E+03	2.5E+03	N/A	1.1E-05	-	-	-
Hexachlorobutadiene	1.0E+03	2.5E+03	N/A	1.50E-01	1.20E+04	1.10E+00	1.36E-01
γ-Hexachlorocyclohexane (Lindane)	1.0E+03	2.5E+03	N/A	9.4E-06	-	-	-
Hexachloroethane	1.0E+03	2.5E+03	N/A	2.1E-01	-	-	-
Indeno(1,2,3-c,d)pyrene	1.0E+03	2.5E+03	N/A	1.0E-06	-	-	-
Lead	2.5E+03	5.0E+03	N/A	-	-	-	-
Mercury (elemental)	1.0E+03	2.5E+03	N/A	2.0E-03	-	-	-
Methoxychlor	1.0E+03	2.5E+03	N/A	1.4E-06	-	-	-
Methylene chloride	1.0E+03	2.4E+03	2.4E+03	4.29E+02	5.60E+05	1.60E+02	2.68E+00
Methyl ethyl ketone	1.0E+03	2.5E+03	3.4E+04	1.00E+02	3.20E+04	1.10E+01	9.09E+00
Methyl isobutyl ketone	5.0E+02	1.0E+03	1.7E+04	1.00E+01	4.20E+02	1.00E-01	1.00E+02
Methyl mercury	5.0E+02	1.0E+03	N/A	-	-	-	-

**Lookup Table F-3. Components for Deep Soil Gross Contamination Ceiling Levels
(mg/kg)**

Chemical	¹Unrestricted Gross Contamination Ceiling Level	Industrial/ Commercial Gross Contamination Ceiling Level	Soil Saturation Limit (mg/kg)	Vapor Pressure (VP) (Torr @ 20-30 °C)	50 Percentile Odor Recognition Threshold (ORT) (µg/m³)	50 Percentile Odor Recognition Threshold (ORT) (ppmv)	Odor Index
2-Methylnaphthalene	1.0E+03	2.5E+03	N/A	6.8E-02	6.80E+01	1.15E-02	5.91E+00
<i>tert</i> -Butyl methyl ether	5.0E+02	1.0E+03	2.1E+04	2.45E+02	5.30E+02	1.30E-01	1.88E+03
Molybdenum	2.5E+03	5.0E+03	N/A	-	-	-	-
Naphthalene	1.0E+03	2.5E+03	N/A	8.2E-02	4.40E+02	8.40E-02	9.76E-01
Nickel	2.5E+03	5.0E+03	N/A	-	-	-	-
Pentachlorophenol	1.0E+03	2.5E+03	N/A	1.1E-04	-	-	-
Perchlorate	2.5E+03	5.0E+03	N/A	-	-	-	-
Phenanthrene	1.0E+03	2.5E+03	N/A	9.6E-04	5.50E+01	7.42E-03	1.29E-01
Phenol	1.0E+03	2.5E+03	N/A	3.50E-01	1.56E+02	4.00E-02	8.75E+00
Polychlorinated biphenyls (PCBs)	1.0E+03	2.5E+03	N/A	4.9E-04 to 6.7E-03	-	-	-
Pyrene	1.0E+03	2.5E+03	N/A	2.5E-06	-	-	-
Selenium	2.5E+03	5.0E+03	N/A	-	-	-	-
Silver	2.5E+03	5.0E+03	N/A	-	-	-	-
Styrene	1.0E+03	1.5E+03	1.5E+03	5.00E+00	1.36E+03	3.00E-01	1.67E+01
<i>tert</i> -Butyl alcohol	5.0E+02	1.0E+03	3.2E+05	4.20E+01	-	-	-
1,1,1,2-Tetrachloroethane	5.0E+02	1.0E+03	2.0E+03	1.20E+01	-	-	-
1,1,2,2-Tetrachloroethane	1.0E+03	1.7E+03	2.0E+03	4.00E+00	1.05E+04	1.50E+00	2.67E+00
Tetrachloroethene	2.3E+02	2.3E+02	2.3E+02	1.90E+01	3.17E+04	4.68E+00	4.06E+00
Thallium	2.5E+03	5.0E+03	N/A	-	-	-	-
Toluene	6.5E+02	6.5E+02	6.5E+02	2.80E+01	3.00E+04	8.00E+00	3.50E+00
Toxaphene	1.0E+03	2.5E+03	N/A	4.00E-01	-	-	-
TPH (gasolines)	5.0E+03	5.0E+03	4.5E+03	3.00E+02	1.00E+02	2.20E-02	1.36E+04
TPH (middle distillates)	5.0E+03	5.0E+03	N/A	5.00E+00	1.00E+03	1.41E-02	3.55E+02
TPH (residual fuels)	5.0E+03	5.0E+03	N/A	-	-	-	-
1,2,4-Trichlorobenzene	1.0E+03	2.5E+03	N/A	2.9E-01	2.20E+04	2.96E+00	9.80E-02
1,1,1-Trichloroethane	1.0E+03	1.2E+03	1.2E+03	1.00E+02	6.51E+04	1.20E+01	8.33E+00
1,1,2-Trichloroethane	5.0E+02	1.0E+03	1.8E+03	2.25E+01	-	-	-
Trichloroethene	1.0E+03	1.3E+03	1.3E+03	7.70E+01	1.36E+06	2.49E+02	3.09E-01

**Lookup Table F-3. Components for Deep Soil Gross Contamination Ceiling Levels
(mg/kg)**

Chemical	¹Unrestricted Gross Contamination Ceiling Level	Industrial/ Commercial Gross Contamination Ceiling Level	Soil Saturation Limit (mg/kg)	Vapor Pressure (VP) (Torr @ 20-30 °C)	50 Percentile Odor Recognition Threshold (ORT) (µg/m³)	50 Percentile Odor Recognition Threshold (ORT) (ppmv)	Odor Index
2,4,5-Trichlorophenol	5.0E+02	1.0E+03	N/A	-	-	-	-
2,4,6-Trichlorophenol	1.0E+03	2.5E+03	N/A	1.2E-02	3.00E-01	3.60E-05	3.33E+02
Vanadium	2.5E+03	5.0E+03	N/A	-	-	-	-
Vinyl chloride	1.0E+03	2.5E+03	1.2E+03	2.58E+03	7.71E+05	2.94E+02	8.78E+00
Xylenes	4.2E+02	4.2E+02	4.2E+02	6.00E+00	4.41E+02	1.00E-01	6.00E+01
Zinc	2.5E+03	5.0E+03	N/A	-	-	-	-

Notes:

1. "Residential Land Use" cleanup standard values generally considered adequate for other sensitive uses (e.g., day-care centers, hospitals, etc.).

Odor Index = VP/ORT in ppm-v

Physical-chemical constants Ontario MOEE (MOEE 1996) except as noted.

Physical-chemical constants for chloroethane and chloromethane from ATSDR Toxicological Profiles (ATSDR 2001).

Odor Recognition Threshold in parts per million by volume (ppmv = (concentration in mg/m³) x (24/molecular weight)).

TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.

Ceiling Level: Based on comparison of vapor pressure and odor index to Table H-1 or saturation limit, if lower.

Saturation limits calculated using equation in USEPA Region 9 PRG guidance (for chemicals that are liquid at ambient temperatures and pressures; refer to Appendix 2).

Odor Threshold for ethanol of 10 ppmv from U.S. Coast Guard Chemical Hazards Response Information System (USCG 1999).

Odor Threshold of 0.13 ppmv for MtBE from information in CaEPA Public Health Goal for MtBE (CaEPA 1999).

TPH VP values from NIOSH (2005); ORT values from ATSDR (2001).

Ceiling Levels for TPH after guidance from Massachusetts Department of Environmental Protection (MADEP 1997a). Adjust as needed in field.

References for vapor pressure and odor threshold data (in order of use):

1. Ontario Ministry of Environment and Energy (MOEE 1996).
2. Massachusetts Department of Environmental Protection (MADEP 1994).
3. Agency for Toxic Substances and Disease Registry (ATSDR 2001).
4. National Library of Medicine, Hazardous Substances Data Bank (NLM 2000).
5. U.S. Department of Health and Human Services (NIOSH 2005).

All water associated with the Snake River Plain Aquifer is considered to be a drinking water source.

**Lookup Table G-1. Groundwater Ceiling Levels
(µg/L)**

Chemical	Final Ceiling Level	Basis	Solubility (1/2)	Taste And Odor Threshold	Basis	Upper Limit
Acenaphthene	2.0E+01	Taste & Odors	2.1E+03	2.0E+01	Ontario MOEE	5.0E+04
Acenaphthylene	2.0E+03	Solubility	2.0E+03	-	-	5.0E+04
Acetone	2.0E+04	Taste & Odors	5.0E+08	2.0E+04	Amoore & Hautala	5.0E+04
Aldrin	8.5E+00	Solubility	8.5E+00	1.7E+01	Ontario MOEE	5.0E+04
Anthracene	2.2E+01	Solubility	2.2E+01	-	-	5.0E+04
Antimony	5.0E+04	Upper Limit		-	-	5.0E+04
Arsenic	5.0E+04	Upper Limit		-	-	5.0E+04
Barium	5.0E+04	Upper Limit		-	-	5.0E+04
Benzene	1.7E+02	Taste & Odors	8.8E+05	1.7E+02	Amoore & Hautala	5.0E+04
Benzo(a)anthracene	5.0E+00	Solubility	5.0E+00	-	-	5.0E+04
Benzo(b)fluoranthene	7.0E+00	Solubility	7.0E+00	-	-	5.0E+04
Benzo(k)fluoranthene	4.0E-01	Solubility	4.0E-01	-	-	5.0E+04
Benzo(g,h,i)perylene	1.3E-01	Solubility	1.3E-01	-	-	5.0E+04
Benzo(a)pyrene	1.9E+00	Solubility	1.9E+00	-	-	5.0E+04
Beryllium	5.0E+04	Upper Limit		-	-	5.0E+04
1,1-Biphenyl	5.0E-01	Taste & Odors	3.8E+03	5.0E-01	Amoore & Hautala	5.0E+04
Bis(2-chloroethyl) ether	3.6E+02	Taste & Odors	8.6E+06	3.6E+02	Amoore & Hautala	5.0E+04
Bis(2-chloroisopropyl) ether	3.2E+02	Taste & Odors	8.5E+05	3.2E+02	Ontario MOEE	5.0E+04
Bis(2-ethylhexyl) phthalate	6.5E+02	Solubility	6.5E+02	-	-	5.0E+04
Boron	5.0E+04	Upper Limit		-	-	5.0E+04
Bromodichloromethane	5.0E+04	Upper Limit	3.4E+06	-	-	5.0E+04
Bromoform (Tribromomethane)	5.1E+02	Taste & Odors	1.6E+06	5.1E+02	Amoore & Hautala	5.0E+04
Bromomethane	5.0E+04	Upper Limit	7.6E+06	-	-	5.0E+04
Cadmium	5.0E+04	Upper Limit		-	-	5.0E+04
Carbon tetrachloride	5.2E+02	Taste & Odors	4.0E+05	5.2E+02	Amoore & Hautala	5.0E+04
Chlordane	2.5E+00	Taste & Odors	2.8E+01	2.5E+00	Ontario MOEE	5.0E+04
p-Chloroaniline	5.0E+04	Upper Limit	1.3E+06	-	-	5.0E+04
Chlorobenzene	5.0E+01	Taste & Odors	2.4E+05	5.0E+01	Amoore & Hautala	5.0E+04
Chloroethane	1.6E+01	Taste & Odors	2.9E+06	1.6E+01	Amoore & Hautala	5.0E+04

**Lookup Table G-1. Groundwater Ceiling Levels
(µg/L)**

Chemical	Final Ceiling Level	Basis	Solubility (1/2)	Taste And Odor Threshold	Basis	Upper Limit
Chloroform	2.4E+03	Taste & Odors	4.0E+06	2.4E+03	Amoore & Hautala	5.0E+04
Chloromethane	5.0E+04	Upper Limit	4.1E+06	-	-	5.0E+04
2-Chlorophenol	1.8E-01	Taste & Odors	1.1E+07	1.8E-01	Ontario MOEE	5.0E+04
Chromium (total)	5.0E+04	Upper Limit	-	-	-	5.0E+04
Chromium III	5.0E+04	Upper Limit	-	-	-	5.0E+04
Chromium VI	5.0E+04	Upper Limit	-	-	-	5.0E+04
Chrysene	8.0E-01	Solubility	8.0E-01	-	-	5.0E+04
Cobalt	5.0E+04	Upper Limit	-	-	-	5.0E+04
Copper	1.0E+03	Taste & Odors	-	1.0E+03	CalDHS 2nd MCL	5.0E+04
Cyanide	1.7E+02	Taste & Odors	5.0E+08	1.7E+02	Amoore & Hautala	5.0E+04
Dibenz(a,h)anthracene	2.5E-01	Solubility	2.5E-01	-	-	5.0E+04
Dibromochloromethane	5.0E+04	Upper Limit	2.2E+06	-	-	5.0E+04
1,2-dibromo-3-chloropropane	1.0E+01	Taste & Odors	6.0E+05	1.0E+01	Amoore & Hautala	5.0E+04
1,2-Dibromoethane	5.0E+04	Upper Limit	1.7E+06	-	-	5.0E+04
1,2-Dichlorobenzene	1.0E+01	Taste & Odors	7.8E+04	1.0E+01	USEPA 2nd MCL	5.0E+04
1,3-Dichlorobenzene	5.0E+04	Upper Limit	7.8E+04	-	-	5.0E+04
1,4-Dichlorobenzene	5.0E+00	Taste & Odors	3.7E+04	5.0E+00	USEPA 2nd MCL	5.0E+04
3,3-Dichlorobenzidine	1.6E+03	Solubility	1.6E+03	-	-	5.0E+04
Dichlorodiphenyldichloroethane (DDD)	8.0E+01	Solubility	8.0E+01	-	-	5.0E+04
Dichlorodiphenyldichloroethene (DDE)	2.0E+01	Solubility	2.0E+01	-	-	5.0E+04
Dichlorodiphenyltrichloroethane (DDT)	1.5E+00	Solubility	1.5E+00	3.5E+02	Ontario MOEE	5.0E+04
1,1-Dichloroethane	5.0E+04	Upper Limit	2.5E+06	-	-	5.0E+04
1,2-Dichloroethane	7.0E+03	Taste & Odors	4.3E+06	7.0E+03	Amoore & Hautala	5.0E+04
1,1-Dichloroethene	1.5E+03	Taste & Odors	1.1E+06	1.5E+03	Amoore & Hautala	5.0E+04
<i>cis</i> -1,2-Dichloroethene	5.0E+04	Upper Limit	1.8E+06	-	-	5.0E+04
<i>trans</i> -1,2-Dichloroethene	2.6E+02	Taste & Odors	3.2E+06	2.6E+02	Amoore & Hautala	5.0E+04
2,4-Dichlorophenol	3.0E-01	Taste & Odors	2.3E+06	3.0E-01	Ontario MOEE	5.0E+04
1,2-Dichloropropane	1.0E+01	Taste & Odors	1.4E+06	1.0E+01	Ontario MOEE	5.0E+04
1,3-Dichloropropene	5.0E+04	Upper Limit	1.4E+06	-	-	5.0E+04

**Lookup Table G-1. Groundwater Ceiling Levels
(µg/L)**

Chemical	Final Ceiling Level	Basis	Solubility (1/2)	Taste And Odor Threshold	Basis	Upper Limit
Dieldrin	4.1E+01	Taste & Odors	9.3E+01	4.1E+01	Ontario MOEE	5.0E+04
Diethyl phthalate	5.0E+04	Upper Limit	4.5E+05	-	-	5.0E+04
Dimethyl phthalate	5.0E+04	Upper Limit	2.5E+06	-	-	5.0E+04
2,4-Dimethylphenol	4.0E+02	Taste & Odors	3.9E+06	4.0E+02	Cal DHS AL	5.0E+04
2,4-Dinitrophenol	5.0E+04	Upper Limit	2.8E+06	-	-	5.0E+04
2,4-Dinitrotoluene	5.0E+04	Upper Limit	1.4E+05	-	-	5.0E+04
1,4-Dioxane	5.0E+04	Upper Limit	5.0E+08	2.3E+05	Amoore & Hautala	5.0E+04
Dioxin (2,3,7,8-TCDD)	7.0E+03	Solubility	7.0E+03	-	-	5.0E+04
Endosulfan	7.5E+01	Solubility	7.5E+01	-	-	5.0E+04
Endrin	4.1E+01	Taste & Odors	1.3E+02	4.1E+01	Ontario MOEE	5.0E+04
Ethylbenzene	3.0E+01	Taste & Odors	8.5E+04	3.0E+01	USEPA 2nd MCL	5.0E+04
Fluoranthene	1.3E+02	Solubility	1.3E+02	-	-	5.0E+04
Fluorene	9.5E+02	Solubility	9.5E+02	-	-	5.0E+04
Heptachlor	2.0E+01	Taste & Odors	2.8E+01	2.0E+01	Ontario MOEE	5.0E+04
Heptachlor epoxide	1.8E+02	Solubility	1.8E+02	-	-	5.0E+04
Hexachlorobenzene	5.5E+01	Solubility	5.5E+01	3.0E+03	Ontario MOEE	5.0E+04
Hexachlorobutadiene	6.0E+00	Taste & Odors	1.0E+03	6.0E+00	Ontario MOEE	5.0E+04
γ-Hexachlorocyclohexane (Lindane)	3.5E+03	Solubility	3.5E+03	1.2E+04	Ontario MOEE	5.0E+04
Hexachloroethane	1.0E+01	Taste & Odors	2.5E+04	1.0E+01	Amoore & Hautala	5.0E+04
Indeno(1,2,3-c,d)pyrene	2.7E-01	Solubility	2.7E-01	-	-	5.0E+04
Lead	5.0E+04	Upper Limit		-	-	5.0E+04
Mercury (elemental)	5.0E+04	Upper Limit		-	-	5.0E+04
Methoxychlor	2.0E+01	Solubility	2.0E+01	4.7E+03	Amoore & Hautala	5.0E+04
Methylene chloride	9.1E+03	Taste & Odors	6.6E+06	9.1E+03	Ontario MOEE	5.0E+04
Methyl ethyl ketone	8.4E+03	Taste & Odors	1.3E+08	8.4E+03	Amoore & Hautala	5.0E+04
Methyl isobutyl ketone	1.3E+03	Taste & Odors	9.5E+06	1.3E+03	Amoore & Hautala	5.0E+04
Methyl mercury	5.0E+04	Upper Limit		-	-	5.0E+04
2-Methylnaphthalene	1.0E+01	Taste & Odors	1.3E+04	1.0E+01	Ontario MOEE	5.0E+04
tert-Butyl methyl ether	5.0E+00	Taste & Odors	7.5E+07	5.0E+00	Cal DHS 2nd MCL	5.0E+04

**Lookup Table G-1. Groundwater Ceiling Levels
(µg/L)**

Chemical	Final Ceiling Level	Basis	Solubility (1/2)	Taste And Odor Threshold	Basis	Upper Limit
Molybdenum	5.0E+04	Upper Limit		-	-	5.0E+04
Naphthalene	2.1E+01	Taste & Odors	1.6E+04	2.1E+01	Amoore & Hautala	5.0E+04
Nickel	5.0E+04	Upper Limit		-	-	5.0E+04
Pentachlorophenol	3.0E+01	Taste & Odors	7.0E+06	3.0E+01	Amoore & Hautala	5.0E+04
Perchlorate	5.0E+04	Upper Limit	1.0E+08	-	-	5.0E+04
Phenanthrene	4.1E+02	Solubility	4.1E+02	1.0E+03	Ontario MOEE	5.0E+04
Phenol	5.0E+00	Taste & Odors	4.0E+07	5.0E+00	Cal DHS AL	5.0E+04
Polychlorinated biphenyls (PCBs)	1.6E+01	Solubility	1.6E+01	-	-	5.0E+04
Pyrene	6.8E+01	Solubility	6.8E+01	-	-	5.0E+04
Selenium	5.0E+04	Upper Limit		-	-	5.0E+04
Silver	1.0E+02	Taste & Odors		1.0E+02	Cal DHS 2nd MCL	5.0E+04
Styrene	1.0E+01	Taste & Odors	1.6E+05	1.0E+01	USEPA 2nd MCL	5.0E+04
<i>tert</i> -Butyl alcohol	5.0E+04	Upper Limit	5.0E+08	-	-	5.0E+04
1,1,1,2-Tetrachloroethane	5.0E+04	Upper Limit	1.5E+06	-	-	5.0E+04
1,1,2,2-Tetrachloroethane	5.0E+02	Taste & Odors	1.5E+06	5.0E+02	Amoore & Hautala	5.0E+04
Tetrachloroethene	1.7E+02	Taste & Odors	1.0E+05	1.7E+02	Amoore & Hautala	5.0E+04
Thallium	5.0E+04	Upper Limit		-	-	5.0E+04
Toluene	4.0E+01	Taste & Odors	2.6E+05	4.0E+01	USEPA 2nd MCL	5.0E+04
Toxaphene	1.4E+02	Taste & Odors	1.5E+03	1.4E+02	USEPA 2nd MCL	5.0E+04
TPH (gasolines)	1.0E+02	Taste & Odors	7.5E+04	1.0E+02	USEPA SNARL	5.0E+04
TPH (middle distillates)	1.0E+02	Taste & Odors	2.5E+03	1.0E+02	USEPA SNARL	5.0E+04
TPH (residual fuels)	1.0E+02	Taste & Odors	2.5E+03	1.0E+02	USEPA SNARL	5.0E+04
1,2,4-Trichlorobenzene	3.0E+03	Taste & Odors	1.5E+05	3.0E+03	USEPA (1995)	5.0E+04
1,1,1-Trichloroethane	9.7E+02	Taste & Odors	6.7E+05	9.7E+02	Amoore & Hautala	5.0E+04
1,1,2-Trichloroethane	5.0E+04	Upper Limit	2.2E+06	-	-	5.0E+04
Trichloroethene	3.1E+02	Taste & Odors	5.5E+05	3.1E+02	Amoore & Hautala	5.0E+04
2,4,5-Trichlorophenol	2.0E+02	Taste & Odors	6.0E+05	2.0E+02	Ontario MOEE	5.0E+04
2,4,6-Trichlorophenol	1.0E+02	Taste & Odors	4.0E+05	1.0E+02	Ontario MOEE	5.0E+04
Vanadium	5.0E+04	Upper Limit		-	-	5.0E+04

Lookup Table G-1. Groundwater Ceiling Levels (µg/L)

Chemical	Final Ceiling Level	Basis	Solubility (1/2)	Taste And Odor Threshold	Basis	Upper Limit
Vinyl chloride	3.4E+03	Taste & Odors	1.4E+06	3.4E+03	Amoore & Hautala	5.0E+04
Xylenes	2.0E+01	Taste & Odors	8.1E+04	2.0E+01	USEPA 2nd MCL	5.0E+04
Zinc	5.0E+03	Taste & Odors		5.0E+03	Cal DHS 2nd MCL	5.0E+04

References:

Unless otherwise noted, criteria for drinking water taste and odor threshold from summary in *A Compilation of Water Quality Goals* (RWQCBCV 2003) or Ontario MOEE if not available (MOEE 1996).

Upper limit of 50000 ug/L intended to limit general groundwater resource degradation (MOEE 1996).

1/2 solubility based on solubility constants in USEPA Region IX (USEPA 1998) or Ontario MOEE (MOEE 1996) if not available.

Notes:

Ceiling Level: lowest of 1/2 solubility, taste and odor threshold and 50000 ug/L maximum level

TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.

TPH ceiling levels after Massachusetts DEP (MADEP 1997a).

TPH Taste and Odor Thresholds based on USEPA Suggested-No-Adverse-reaction (SNARL) level for TPH diesel.

All water associated with the Snake River Plain Aquifer is considered to be a drinking water source.

**Lookup Table G-2. Surface Water Ceiling Levels
(µg/L)**

Chemical	Final Ceiling Level	Basis	Solubility (1/2)	Taste And Odor Threshold	Basis	Upper Limit
Acenaphthene	2.0E+01	Taste & Odors	2.1E+03	2.0E+01	Ontario MOEE	5.0E+04
Acenaphthylene	2.0E+03	Solubility	2.0E+03	-	-	5.0E+04
Acetone	2.0E+04	Taste & Odors	5.0E+08	2.0E+04	Amoore & Hautala	5.0E+04
Aldrin	8.5E+00	Solubility	8.5E+00	1.7E+01	Ontario MOEE	5.0E+04
Anthracene	2.2E+01	Solubility	2.2E+01	-	-	5.0E+04
Antimony	5.0E+04	Upper Limit		-	-	5.0E+04
Arsenic	5.0E+04	Upper Limit		-	-	5.0E+04
Barium	5.0E+04	Upper Limit		-	-	5.0E+04
Benzene	1.7E+02	Taste & Odors	8.8E+05	1.7E+02	Amoore & Hautala	5.0E+04
Benzo(a)anthracene	5.0E+00	Solubility	5.0E+00	-	-	5.0E+04
Benzo(b)fluoranthene	7.0E+00	Solubility	7.0E+00	-	-	5.0E+04
Benzo(k)fluoranthene	4.0E-01	Solubility	4.0E-01	-	-	5.0E+04
Benzo(g,h,i)perylene	1.3E-01	Solubility	1.3E-01	-	-	5.0E+04
Benzo(a)pyrene	1.9E+00	Solubility	1.9E+00	-	-	5.0E+04
Beryllium	5.0E+04	Upper Limit		-	-	5.0E+04
1,1-Biphenyl	5.0E-01	Taste & Odors	3.8E+03	5.0E-01	Amoore & Hautala	5.0E+04
Bis(2-chloroethyl) ether	3.6E+02	Taste & Odors	8.6E+06	3.6E+02	Amoore & Hautala	5.0E+04
Bis(2-chloroisopropyl) ether	3.2E+02	Taste & Odors	8.5E+05	3.2E+02	Ontario MOEE	5.0E+04
Bis(2-ethylhexyl) phthalate	6.5E+02	Solubility	6.5E+02	-	-	5.0E+04
Boron	5.0E+04	Upper Limit		-	-	5.0E+04
Bromodichloromethane	5.0E+04	Upper Limit	3.4E+06	-	-	5.0E+04
Bromoform (Tribromomethane)	5.1E+02	Taste & Odors	1.6E+06	5.1E+02	Amoore & Hautala	5.0E+04
Bromomethane	5.0E+04	Upper Limit	7.6E+06	-	-	5.0E+04
Cadmium	5.0E+04	Upper Limit		-	-	5.0E+04
Carbon tetrachloride	5.2E+02	Taste & Odors	4.0E+05	5.2E+02	Amoore & Hautala	5.0E+04
Chlordane	2.5E+00	Taste & Odors	2.8E+01	2.5E+00	Ontario MOEE	5.0E+04
p-Chloroaniline	5.0E+04	Upper Limit	1.3E+06	-	-	5.0E+04
Chlorobenzene	5.0E+01	Taste & Odors	2.4E+05	5.0E+01	Amoore & Hautala	5.0E+04
Chloroethane	1.6E+01	Taste & Odors	2.9E+06	1.6E+01	Amoore & Hautala	5.0E+04

**Lookup Table G-2. Surface Water Ceiling Levels
(µg/L)**

Chemical	Final Ceiling Level	Basis	Solubility (1/2)	Taste And Odor Threshold	Basis	Upper Limit
Chloroform	2.4E+03	Taste & Odors	4.0E+06	2.4E+03	Amoore & Hautala	5.0E+04
Chloromethane	5.0E+04	Upper Limit	4.1E+06	-	-	5.0E+04
2-Chlorophenol	1.8E-01	Taste & Odors	1.1E+07	1.8E-01	Ontario MOEE	5.0E+04
Chromium (total)	5.0E+04	Upper Limit	-	-	-	5.0E+04
Chromium III	5.0E+04	Upper Limit	-	-	-	5.0E+04
Chromium VI	5.0E+04	Upper Limit	-	-	-	5.0E+04
Chrysene	8.0E-01	Solubility	8.0E-01	-	-	5.0E+04
Cobalt	5.0E+04	Upper Limit	-	-	-	5.0E+04
Copper	1.0E+03	Taste & Odors	-	1.0E+03	CalDHS 2nd MCL	5.0E+04
Cyanide	1.7E+02	Taste & Odors	5.0E+08	1.7E+02	Amoore & Hautala	5.0E+04
Dibenz(a,h)anthracene	2.5E-01	Solubility	2.5E-01	-	-	5.0E+04
Dibromochloromethane	5.0E+04	Upper Limit	2.2E+06	-	-	5.0E+04
1,2-dibromo-3-chloropropane	1.0E+01	Taste & Odors	6.0E+05	1.0E+01	Amoore & Hautala	5.0E+04
1,2-Dibromoethane	5.0E+04	Upper Limit	1.7E+06	-	-	5.0E+04
1,2-Dichlorobenzene	1.0E+01	Taste & Odors	7.8E+04	1.0E+01	USEPA 2nd MCL	5.0E+04
1,3-Dichlorobenzene	5.0E+04	Upper Limit	7.8E+04	-	-	5.0E+04
1,4-Dichlorobenzene	5.0E+00	Taste & Odors	3.7E+04	5.0E+00	USEPA 2nd MCL	5.0E+04
3,3-Dichlorobenzidine	1.6E+03	Solubility	1.6E+03	-	-	5.0E+04
Dichlorodiphenyldichloroethane (DDD)	8.0E+01	Solubility	8.0E+01	-	-	5.0E+04
Dichlorodiphenyldichloroethene (DDE)	2.0E+01	Solubility	2.0E+01	-	-	5.0E+04
Dichlorodiphenyltrichloroethane (DDT)	1.5E+00	Solubility	1.5E+00	3.5E+02	Ontario MOEE	5.0E+04
1,1-Dichloroethane	5.0E+04	Upper Limit	2.5E+06	-	-	5.0E+04
1,2-Dichloroethane	7.0E+03	Taste & Odors	4.3E+06	7.0E+03	Amoore & Hautala	5.0E+04
1,1-Dichloroethene	1.5E+03	Taste & Odors	1.1E+06	1.5E+03	Amoore & Hautala	5.0E+04
<i>cis</i> -1,2-Dichloroethene	5.0E+04	Upper Limit	1.8E+06	-	-	5.0E+04
<i>trans</i> -1,2-Dichloroethene	2.6E+02	Taste & Odors	3.2E+06	2.6E+02	Amoore & Hautala	5.0E+04
2,4-Dichlorophenol	3.0E-01	Taste & Odors	2.3E+06	3.0E-01	Ontario MOEE	5.0E+04
1,2-Dichloropropane	1.0E+01	Taste & Odors	1.4E+06	1.0E+01	Ontario MOEE	5.0E+04
1,3-Dichloropropene	5.0E+04	Upper Limit	1.4E+06	-	-	5.0E+04

**Lookup Table G-2. Surface Water Ceiling Levels
(µg/L)**

Chemical	Final Ceiling Level	Basis	Solubility (1/2)	Taste And Odor Threshold	Basis	Upper Limit
Dieldrin	4.1E+01	Taste & Odors	9.3E+01	4.1E+01	Ontario MOEE	5.0E+04
Diethyl phthalate	5.0E+04	Upper Limit	4.5E+05	-	-	5.0E+04
Dimethyl phthalate	5.0E+04	Upper Limit	2.5E+06	-	-	5.0E+04
2,4-Dimethylphenol	4.0E+02	Taste & Odors	3.9E+06	4.0E+02	Cal DHS AL	5.0E+04
2,4-Dinitrophenol	5.0E+04	Upper Limit	2.8E+06	-	-	5.0E+04
2,4-Dinitrotoluene	5.0E+04	Upper Limit	1.4E+05	-	-	5.0E+04
1,4-Dioxane	5.0E+04	Upper Limit	5.0E+08	2.3E+05	Amoore & Hautala	5.0E+04
Dioxin (2,3,7,8-TCDD)	7.0E+03	Solubility	7.0E+03	-	-	5.0E+04
Endosulfan	7.5E+01	Solubility	7.5E+01	-	-	5.0E+04
Endrin	4.1E+01	Taste & Odors	1.3E+02	4.1E+01	Ontario MOEE	5.0E+04
Ethylbenzene	3.0E+01	Taste & Odors	8.5E+04	3.0E+01	USEPA 2nd MCL	5.0E+04
Fluoranthene	1.3E+02	Solubility	1.3E+02	-	-	5.0E+04
Fluorene	9.5E+02	Solubility	9.5E+02	-	-	5.0E+04
Heptachlor	2.0E+01	Taste & Odors	2.8E+01	2.0E+01	Ontario MOEE	5.0E+04
Heptachlor epoxide	1.8E+02	Solubility	1.8E+02	-	-	5.0E+04
Hexachlorobenzene	5.5E+01	Solubility	5.5E+01	3.0E+03	Ontario MOEE	5.0E+04
Hexachlorobutadiene	6.0E+00	Taste & Odors	1.0E+03	6.0E+00	Ontario MOEE	5.0E+04
γ-Hexachlorocyclohexane (Lindane)	3.5E+03	Solubility	3.5E+03	1.2E+04	Ontario MOEE	5.0E+04
Hexachloroethane	1.0E+01	Taste & Odors	2.5E+04	1.0E+01	Amoore & Hautala	5.0E+04
Indeno(1,2,3-c,d)pyrene	2.7E-01	Solubility	2.7E-01	-	-	5.0E+04
Lead	5.0E+04	Upper Limit		-	-	5.0E+04
Mercury (elemental)	5.0E+04	Upper Limit		-	-	5.0E+04
Methoxychlor	2.0E+01	Solubility	2.0E+01	4.7E+03	Amoore & Hautala	5.0E+04
Methylene chloride	9.1E+03	Taste & Odors	6.6E+06	9.1E+03	Ontario MOEE	5.0E+04
Methyl ethyl ketone	8.4E+03	Taste & Odors	1.3E+08	8.4E+03	Amoore & Hautala	5.0E+04
Methyl isobutyl ketone	1.3E+03	Taste & Odors	9.5E+06	1.3E+03	Amoore & Hautala	5.0E+04
Methyl mercury	5.0E+04	Upper Limit		-	-	5.0E+04
2-Methylnaphthalene	1.0E+01	Taste & Odors	1.3E+04	1.0E+01	Ontario MOEE	5.0E+04
tert-Butyl methyl ether	5.0E+00	Taste & Odors	7.5E+07	5.0E+00	Cal DHS 2nd MCL	5.0E+04

**Lookup Table G-2. Surface Water Ceiling Levels
(µg/L)**

Chemical	Final Ceiling Level	Basis	Solubility (1/2)	Taste And Odor Threshold	Basis	Upper Limit
Molybdenum	5.0E+04	Upper Limit		-	-	5.0E+04
Naphthalene	2.1E+01	Taste & Odors	1.6E+04	2.1E+01	Amoore & Hautala	5.0E+04
Nickel	5.0E+04	Upper Limit		-	-	5.0E+04
Pentachlorophenol	3.0E+01	Taste & Odors	7.0E+06	3.0E+01	Amoore & Hautala	5.0E+04
Perchlorate	5.0E+04	Upper Limit	1.0E+08	-	-	5.0E+04
Phenanthrene	4.1E+02	Solubility	4.1E+02	1.0E+03	Ontario MOEE	5.0E+04
Phenol	5.0E+00	Taste & Odors	4.0E+07	5.0E+00	Cal DHS AL	5.0E+04
Polychlorinated biphenyls (PCBs)	1.6E+01	Solubility	1.6E+01	-	-	5.0E+04
Pyrene	6.8E+01	Solubility	6.8E+01	-	-	5.0E+04
Selenium	5.0E+04	Upper Limit		-	-	5.0E+04
Silver	1.0E+02	Taste & Odors		1.0E+02	Cal DHS 2nd MCL	5.0E+04
Styrene	1.0E+01	Taste & Odors	1.6E+05	1.0E+01	USEPA 2nd MCL	5.0E+04
<i>tert</i> -Butyl alcohol	5.0E+04	Upper Limit	5.0E+08	-	-	5.0E+04
1,1,1,2-Tetrachloroethane	5.0E+04	Upper Limit	1.5E+06	-	-	5.0E+04
1,1,2,2-Tetrachloroethane	5.0E+02	Taste & Odors	1.5E+06	5.0E+02	Amoore & Hautala	5.0E+04
Tetrachloroethene	1.7E+02	Taste & Odors	1.0E+05	1.7E+02	Amoore & Hautala	5.0E+04
Thallium	5.0E+04	Upper Limit		-	-	5.0E+04
Toluene	4.0E+01	Taste & Odors	2.6E+05	4.0E+01	USEPA 2nd MCL	5.0E+04
Toxaphene	1.4E+02	Taste & Odors	1.5E+03	1.4E+02	USEPA 2nd MCL	5.0E+04
TPH (gasolines)	1.0E+02	Taste & Odors	7.5E+04	1.0E+02	USEPA SNARL	5.0E+04
TPH (middle distillates)	1.0E+02	Taste & Odors	2.5E+03	1.0E+02	USEPA SNARL	5.0E+04
TPH (residual fuels)	1.0E+02	Taste & Odors	2.5E+03	1.0E+02	USEPA SNARL	5.0E+04
1,2,4-Trichlorobenzene	3.0E+03	Taste & Odors	1.5E+05	3.0E+03	USEPA (1995)	5.0E+04
1,1,1-Trichloroethane	9.7E+02	Taste & Odors	6.7E+05	9.7E+02	Amoore & Hautala	5.0E+04
1,1,2-Trichloroethane	5.0E+04	Upper Limit	2.2E+06	-	-	5.0E+04
Trichloroethene	3.1E+02	Taste & Odors	5.5E+05	3.1E+02	Amoore & Hautala	5.0E+04
2,4,5-Trichlorophenol	2.0E+02	Taste & Odors	6.0E+05	2.0E+02	Ontario MOEE	5.0E+04
2,4,6-Trichlorophenol	1.0E+02	Taste & Odors	4.0E+05	1.0E+02	Ontario MOEE	5.0E+04
Vanadium	5.0E+04	Upper Limit		-	-	5.0E+04

Lookup Table G-2. Surface Water Ceiling Levels (µg/L)

Chemical	Final Ceiling Level	Basis	Solubility (1/2)	Taste And Odor Threshold	Basis	Upper Limit
Vinyl chloride	3.4E+03	Taste & Odors	1.4E+06	3.4E+03	Amoore & Hautala	5.0E+04
Xylenes	2.0E+01	Taste & Odors	8.1E+04	2.0E+01	USEPA 2nd MCL	5.0E+04
Zinc	5.0E+03	Taste & Odors		5.0E+03	Cal DHS 2nd MCL	5.0E+04

References:

Unless otherwise noted, criteria for drinking water taste and odor threshold from summary in *A Compilation of Water Quality Goals*

(RWQCBCV 2003) or Ontario MOEE if not available (MOEE 1996).

Upper limit of 50000 ug/L intended to limit general groundwater resource degradation (MOEE 1996).

1/2 solubility based on solubility constants in USEPA Region 9 (USEPA 2004) or Ontario MOEE (MOEE 1996) if not available.

Notes:

Ceiling Level: lowest of 1/2 solubility, taste and odor threshold and 50000 ug/L maximum level

TPH -Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.

TPH ceiling levels after Massachusetts DEP (MADEP 1997a).

TPH Taste and Odor Thresholds based on USEPA Suggested-No-Adverse-reaction (SNARL) level for TPH diesel.

All water associated with the Snake River Plain Aquifer is considered to be a drinking water source.

Lookup Table H. Physical-Chemical and Toxicity Values Used in Models

Chemical	State		Molecular Weight (g/mole)	Organic Carbon Partition Coefficient K_{oc} (cm ³ /g)	Diffusivity in Air D_a (cm ² /s)	Diffusivity in Water D_w (cm ² /s)	Pure Component Water Solubility S (mg/L)	Henry's Law Constant H (atm·m ³ /mol)	Adjusted Henry's Law Constant H' (atm·m ³ /mol)	Skin Absorption Factor ABS (unitless)	Oral SF_o	Cancer Slope Factor (mg/kg·day) ⁻¹	Inhalation Cancer Slope Factor SF_i (mg/kg·day) ⁻¹	Oral Reference Dose RfD_o (mg/kg·day)	Inhalation Reference Dose RfD_i (mg/kg·day)	Unit Risk Factor URF (ug/m ³)	Reference Concentration RfC (ug/m ³)
Acenaphthene	V	S	154	4.9E+03	4.2E-02	7.7E-06	4.2E+00	1.6E-04	6.4E-03	0.13				6.0E-02	6.0E-02		2.1E+02
Acenaphthylene	V	S	152	2.5E+03			3.9E+00	1.5E-03	5.9E-02	0.13				3.0E-02	3.0E-02		1.1E+02
Acetone	V	L	58	5.8E-01	1.2E-01	1.1E-05	1.0E+06	3.9E-05	1.6E-03					9.0E-01	9.0E-01		3.2E+03
Aldrin	NV	S	365	4.9E+04			1.7E-02	5.0E-05	2.0E-03	0.05	1.7E+01	1.7E+01		3.0E-05	3.0E-05		
Anthracene	V	S	178	2.4E+04	3.2E-02	7.7E-06	4.3E-02	6.5E-05	2.7E-03	0.13				3.0E-01	3.0E-01		1.1E+03
Antimony	NV	S	122											4.0E-04			
Arsenic	NV	S	75							0.03	1.5E+00	1.5E+01		3.0E-04			
Barium	NV	S	137											2.0E-01	1.4E-04		
Benzene	V	L	78	5.9E+01	8.8E-02	9.8E-06	1.8E+03	5.6E-03	2.3E-01		1.0E-01	1.0E-01		4.0E-03	8.6E-03	2.9E-05	3.0E+01
Benzo(a)anthracene	NV	S	228	2.0E+05			1.0E-02	1.0E-06	4.1E-05	0.13	1.2E+00	3.9E-01		3.0E-02	3.0E-02		
Benzo(b)fluoranthene	NV	S	252	5.5E+05			1.4E-02	1.2E-05	5.0E-04	0.13	1.2E+00	3.9E-01		3.0E-02	3.0E-02		
Benzo(k)fluoranthene	NV	S	252	5.5E+05			8.0E-04	3.9E-05	1.6E-03	0.13	1.2E+00	3.9E-01		3.0E-02	3.0E-02		
Benzo(g,h,i)perylene	NV	S	276	1.6E+06			2.6E-04	1.4E-07	5.9E-06	0.13				3.0E-02	3.0E-02		
Benzo(a)pyrene	NV	S	252	5.5E+06			3.8E-03	4.9E-07	2.0E-05	0.13	1.2E+01	3.9E+00		3.0E-02	3.0E-02		
Beryllium	NV	S	9										8.4E+00	2.0E-03	5.7E-06		
1,1-Biphenyl	V	S	150	7.8E+03	4.0E-02	8.2E-06	7.5E+00	3.0E-04	1.2E-02	0.1				5.0E-02			
Bis(2-chloroethyl) ether	V	L	142	7.6E+01	6.9E-02	7.5E-06	1.7E+04	1.8E-05	7.4E-04		1.1E+00	1.2E+00				3.3E-04	
Bis(2-chloroisopropyl) ether	V	L	171	6.1E+01	6.3E-02	6.4E-06	1.7E+03	1.1E-04	4.6E-03		2.5E+00	2.5E+00		4.0E-02	4.0E-02	7.1E-04	1.4E+02
Bis(2-ethylhexyl) phthalate	NV	S	391	1.0E+05			1.3E+00	3.0E-07	1.2E-05	0.1	1.4E-02	8.4E-03		2.0E-02	2.2E-02		
Boron	NV	S	11											2.0E-01	5.7E-03		
Bromodichloromethane	V	L	164	5.5E+01	3.0E-02	1.1E-05	6.7E+03	1.6E-03	6.6E-02		6.2E-02	6.2E-02		2.0E-02	2.0E-02	1.8E-05	7.0E+01
Bromoform (Tribromomethane)	NV	S	253	1.1E+02			3.2E+03	5.3E-04	2.2E-02		7.9E-03	3.9E-03		2.0E-02	2.0E-02		
Bromomethane	V	G	95	9.0E+00	7.3E-02	1.2E-05	1.5E+04	6.2E-03	2.6E-01					1.4E-03	1.4E-03		5.0E+00
Cadmium	NV	S	112							0.001	3.8E-01	1.5E+01		5.0E-04			
Carbon tetrachloride	V	L	154	1.7E+02	7.8E-02	8.8E-06	7.9E+02	3.0E-02	1.2E+00		1.5E-01	4.6E-01		7.0E-04	1.1E-02	1.3E-04	4.0E+01
Chlordane	NV	S	410	4.4E+04			5.6E-02	4.8E-05	2.0E-03	0.04	1.3E+00	1.2E+00		5.0E-04	2.0E-04		
p-Chloroaniline	NV	S	128	6.4E+01			2.6E+03	3.3E-07	1.4E-05					4.0E-03			
Chlorobenzene	V	L	113	2.2E+02	7.3E-02	8.7E-06	4.7E+02	3.7E-03	1.5E-01					2.0E-02	2.9E-01		1.0E+03
Chloroethane	V	G	65	1.5E+01	1.0E-01	1.2E-05	5.7E+03	1.1E-02	4.5E-01		2.9E-03			4.0E-01	2.9E-02		1.0E+02
Chloroform	V	L	119	4.0E+01	1.0E-01	1.0E-05	7.9E+03	3.7E-03	1.5E-01		3.1E-02	1.9E-02		1.0E-02	8.6E-02	5.3E-06	3.0E+02
Chloromethane	V	G	51	3.5E+01	1.1E-01	6.5E-06	8.2E+03	2.4E-02	9.8E-01					2.6E-02	2.6E-02		9.0E+01
2-Chlorophenol	V	L	132	4.0E+02	5.0E-01	9.5E-06	2.2E+04	3.9E-04	1.6E-02					5.0E-03	5.0E-03		1.8E+01
Chromium (total)	NV	S	52														
Chromium III	NV	S	52											1.5E+00			
Chromium VI	NV	S	52									5.3E+02		3.0E-03	2.9E-08		
Chrysene	NV	S	228	4.0E+05	2.5E-02	6.2E-06	1.6E-03	9.5E-05	3.9E-03	0.13	7.3E-03	3.1E-03		3.0E-02	3.0E-02		
Cobalt	NV	S	59										9.8E+00	2.0E-02	5.7E-06		
Copper	NV	S	64											4.0E-01			
Cyanide	V	S	26	1.7E+01	1.8E-01	1.8E-05	1.0E+06	1.3E-04	5.3E-03	0.1				2.0E-02	2.0E-02		7.0E+01
Dibenz(a,h)anthracene	NV	S	278	3.3E+06			5.0E-04	7.3E-08	3.0E-06	0.13	7.3E+00	3.1E+00		3.0E-02	3.0E-02		
Dibromochloromethane	V	S	208	4.7E+02	9.6E-02	1.0E-05	4.4E+03	8.5E-04	3.5E-02		8.4E-02			2.0E-02			

Lookup Table H. Physical-Chemical and Toxicity Values Used in Models

Chemical	State		Molecular Weight (g/mole)	Organic Carbon Partition Coefficient K_{oc} (cm ³ /g)	Diffusivity in Air D_a (cm ² /s)	Diffusivity in Water D_w (cm ² /s)	Pure Component Water Solubility S (mg/L)	Henry's Law Constant H (atm·m ³ /mol)	Adjusted Henry's Law Constant H' (atm·m ³ /mol)	Skin Absorption Factor ABS (unitless)	Oral SF_o	Cancer Slope Factor (mg/kg·day) ⁻¹	Inhalation Cancer Slope Factor SF_i (mg/kg·day) ⁻¹	Oral Reference Dose RfD_o (mg/kg·day)	Inhalation Reference Dose RfD_i (mg/kg·day)	Unit Risk Factor URF (ug/m ³)	Reference Concentration RfC (ug/m ³)
	V	L															
1,2-dibromo-3-chloropropane	V	L	236	1.3E+02	2.1E-02	7.0E-06	1.2E+03	1.5E-04	6.0E-03			7.0E+00	6.7E+00		5.7E-05	1.9E-03	2.0E-01
1,2-Dibromoethane	V	S	188	2.8E+01	7.3E-02	8.1E-06	3.4E+03	3.2E-04	1.3E-02			3.6E+00	2.1E+00	9.0E-03	2.6E-03	6.0E-04	9.0E+00
1,2-Dichlorobenzene	V	L	147	6.2E+02	6.9E-02	7.9E-06	1.6E+02	1.9E-03	7.8E-02					9.0E-02	5.7E-02		2.0E+02
1,3-Dichlorobenzene	V	L	147	6.2E+02	6.9E-02	7.9E-06	1.6E+02	1.9E-03	7.8E-02					3.0E-02	3.0E-02		1.1E+02
1,4-Dichlorobenzene	V	S	147	6.2E+02	6.9E-02	7.9E-06	7.4E+01	2.4E-03	1.0E-01			2.4E-02	3.9E-02	3.0E-02	2.3E-01	1.1E-05	8.0E+02
3,3-Dichlorobenzidine	NV	S	253	1.6E+03			3.1E+00	8.3E-07	3.4E-05			1.2E+00	1.1E+00				
Dichlorodiphenyldichloroethane (DDD)	NV	S	331	7.8E+05			1.6E-01	8.0E-06	3.3E-04	0.03		2.4E-01	2.4E-01	5.0E-04	5.0E-04		
Dichlorodiphenyldichloroethene (DDE)	NV	S	329	4.4E+06			4.0E-02	6.8E-05	2.8E-03	0.03		3.4E-01	3.4E-01	5.0E-04	5.0E-04		
Dichlorodiphenyltrichloroethane (DDT)	NV	S	355	2.4E+05			3.0E-03	3.9E-05	1.6E-03	0.03		3.4E-01	3.4E-01	5.0E-04	5.0E-04		
1,1-Dichloroethane	V	L	99	3.2E+01	7.4E-02	1.1E-05	5.1E+03	5.6E-03	2.3E-01			5.7E-03	5.6E-03	1.0E-01	1.4E-01	1.6E-06	5.0E+02
1,2-Dichloroethane	V	L	99	1.7E+01	1.0E-01	9.9E-06	8.5E+03	9.8E-04	4.0E-02			9.1E-02	9.1E-02	2.0E-02	1.4E-03	2.6E-05	4.9E+00
1,1-Dichloroethene	V	L	97	5.9E+01	9.0E-02	1.0E-05	2.3E+03	2.6E-02	1.1E+00					5.0E-02	5.7E-02		2.0E+02
cis-1,2-Dichloroethene	V	L	97	3.6E+01	7.4E-02	1.1E-05	3.5E+03	4.1E-03	1.7E-01					1.0E-02	1.0E-02		3.5E+01
trans-1,2-Dichloroethene	V	L	97	5.3E+01	7.1E-02	1.2E-05	6.3E+03	9.4E-03	3.8E-01					2.0E-02	2.0E-02		7.0E+01
2,4-Dichlorophenol	NV	S	163	6.0E+03			4.5E+03	2.8E-06	1.1E-04					3.0E-03	3.0E-03		
1,2-Dichloropropane	V	L	113	4.4E+01	7.8E-02	8.7E-06	2.8E+03	2.8E-03	1.1E-01			6.8E-02	3.5E-02		1.1E-03	1.0E-05	4.0E+00
1,3-Dichloropropene	V	L	111	4.6E+01	6.3E-02	1.0E-05	2.8E+03	1.8E-02	7.3E-01			1.0E-01	5.6E-02	3.0E-02	5.7E-03	1.6E-05	2.0E+01
Dieldrin	NV	S	381	7.4E+03			1.9E-01	5.8E-05	2.4E-03	0.05		1.6E+01	1.6E+01	5.0E-05	5.0E-05		
Diethyl phthalate	NV	S	222	1.4E+02			9.0E+02	1.1E-06	4.7E-05	0.1				8.0E-01	8.0E-01		
Dimethyl phthalate	NV	S	194	1.4E+02			5.0E+03	1.1E-07	4.3E-06	0.1				1.0E+01	1.0E+01		
2,4-Dimethylphenol	V	S	122	4.0E+01	5.8E-02	8.7E-06	7.9E+03	1.7E-05	7.0E-04					2.0E-02			
2,4-Dinitrophenol	NV	S	184	1.7E+01			5.6E+03	6.5E-10	2.6E-08					2.0E-02	2.0E-03		
2,4-Dinitrotoluene	NV	S	182	4.5E+01			2.7E+02	4.5E-06	1.8E-04			6.8E-01	3.1E-01	2.0E-03	2.0E-03		
1,4-Dioxane	NV	L	88	3.5E+00			1.0E+06	3.0E-06	1.2E-04			2.7E-02	2.7E-02		8.6E-01		
Dioxin (2,3,7,8-TCDD)	NV	S	322	1.3E+07			1.4E+01	8.1E-05	3.3E-03	0.03		1.3E+05	1.3E+05				
Endosulfan	NV	S	407	3.2E+03			1.5E-01	1.0E-05	4.1E-04	0.05				6.0E-03	6.0E-03		
Endrin	NV	S	381	1.7E+03			2.6E-01	7.5E-06	3.1E-04	0.05				3.0E-04	3.0E-04		
Ethylbenzene	V	L	106	3.6E+02	7.5E-02	7.8E-06	1.7E+02	7.9E-03	3.2E-01			1.1E-02	8.7E-03	1.0E-01	2.9E-01	2.5E-06	1.0E+03
Fluoranthene	NV	S	202	3.8E+04			2.7E-01	6.5E-06	2.7E-04	0.13				4.0E-02	4.0E-02		
Fluorene	V	S	166	1.4E+04	6.1E-02	7.9E-06	1.9E+00	7.7E-05	3.2E-03	0.13				4.0E-02	4.0E-02		1.4E+02
Heptachlor	NV	S	373	2.2E+04			5.6E-02	1.5E-03	6.1E-02	0.05		4.5E+00	4.6E+00	5.0E-04	5.0E-04		
Heptachlor epoxide	NV	S	389	2.3E+04			3.5E-01	3.2E-05	1.3E-03	0.05		9.1E+00	9.1E+00	1.3E-05	1.3E-05		
Hexachlorobenzene	NV	S	285	1.2E+06			1.1E-01	1.7E-03	7.0E-02	0.05		1.6E+00	1.6E+00	8.0E-04	8.0E-04		
Hexachlorobutadiene	NV	S	261	2.9E+04			2.0E+00	2.6E-02	1.0E+00			7.8E-02	7.8E-02	2.0E-04	2.0E-04		
γ-Hexachlorocyclohexane (Lindane)	NV	S	291	3.7E+03			7.0E+00	4.9E-07	2.0E-05	0.05				3.0E-04			
Hexachloroethane	NV	S	237	2.0E+04			5.0E+01	9.9E-03	4.0E-01	0.1		3.9E-02	3.9E-02	1.0E-03	1.0E-03		
Indeno(1,2,3-c,d)pyrene	NV	S	276	1.6E+06			5.3E-04	7.0E-08	2.8E-06	0.13		7.3E-01	3.1E-01	3.0E-02	3.0E-02		
Lead	NV	S	207														
Mercury (elemental)	V	S	201											8.6E-05	2.6E-05		9.0E-02
Methoxychlor	NV	S	347	7.9E+04			4.0E-02	1.6E-05	6.5E-04	0.05							
Methylene chloride	V	L	85	1.1E+01	1.0E-01	1.2E-05	1.3E+04	2.2E-03	9.0E-02			1.4E-02	1.6E-03	6.0E-02	1.1E-01	4.7E-07	4.0E+02

Lookup Table H. Physical-Chemical and Toxicity Values Used in Models

Chemical	State		Molecular Weight (g/mole)	Organic Carbon Partition Coefficient K_{oc} (cm ³ /g)	Diffusivity in Air D_a (cm ² /s)	Diffusivity in Water D_w (cm ² /s)	Pure Component Water Solubility S (mg/L)	Henry's Law Constant H (atm·m ³ /mol)	Adjusted Henry's Law Constant H' (atm·m ³ /mol)	Skin Absorption Factor ABS (unitless)	Oral SF_o	Cancer Slope Factor (mg/kg·day) ⁻¹	Inhalation Cancer Slope Factor SF_i (mg/kg·day) ⁻¹	Oral Reference Dose RfD_o (mg/kg·day)	Inhalation Reference Dose RfD_i (mg/kg·day)	Unit Risk Factor URF (ug/m ³)	Reference Concentration RfC (ug/m ³)
	V	L															
Methyl ethyl ketone	V	L	72	4.5E+00	9.0E-02	9.8E-06	2.7E+05	2.7E-05	1.1E-03					6.0E-01	1.4E+00		5.0E+03
Methyl isobutyl ketone	V	L	100	1.3E+02	7.5E-02	7.8E-06	1.9E+04	1.4E-04	5.7E-03					8.6E-01	8.6E-01		3.0E+03
Methyl mercury	NV	S	216							0.1				1.0E-04			
2-Methylnaphthalene	V	S	142	7.2E+02	5.9E-02	7.5E-06	2.6E+01	2.9E-04	1.2E-02	0.13				4.0E-03			
tert-Butyl methyl ether	V	L	88	6.0E+00	8.0E-02	1.0E-05	1.5E+05	5.9E-04	2.4E-02			9.1E-04	9.1E-04		8.6E-01	2.6E-07	3.0E+03
Molybdenum	NV	S	96											5.0E-03			
Naphthalene	V	S	128	1.2E+03	5.9E-02	7.5E-06	3.1E+01	4.8E-04	2.0E-02	0.13			1.2E-01	2.0E-02	8.6E-04	3.4E-05	3.0E+00
Nickel	NV	S	59											2.0E-02	1.4E-05		
Pentachlorophenol	NV	S	266	3.2E+04			1.4E+04	2.8E-06	1.1E-04	0.25		1.2E-01	1.6E-02	3.0E-03			
Perchlorate	NV	S	100				2.0E+05							7.0E-04			
Phenanthrene	V	S	178	1.4E+04			8.2E-01	3.9E-05		0.13				3.0E-02	3.0E-02		1.1E+02
Phenol	NV	S	94	9.1E+01			8.0E+04	1.3E-06	5.3E-05					3.0E-01			
Polychlorinated biphenyls (PCBs)	NV	S	327 (ave)	3.3E+04			3.2E-02	5.2E-04	2.1E-02	0.14		2.0E+00	2.0E+00	2.0E-05	2.0E-05		
Pyrene	V	S	202	1.1E+05	2.7E-02	7.2E-06	1.4E-01	1.1E-05	4.5E-04	0.13				6.0E-02	3.0E-02		1.1E+02
Selenium	NV	S	79											5.0E-03			
Silver	NV	S	47											5.0E-03			
Styrene	V	L	104	7.8E+02	7.1E-02	8.0E-06	3.1E+02	2.8E-03	1.1E-01					2.0E-01	2.6E-01		9.0E+02
tert-Butyl alcohol	V	L	74	3.7E+01	9.0E-02	9.1E-06	1.0E+06	1.2E-05	4.8E-04								
1,1,1,2-Tetrachloroethane	V	L	168	9.4E+01	7.1E-02	7.9E-06	3.0E+03	3.5E-04	1.4E-02			2.6E-02	2.7E-02	3.0E-02		7.6E-06	
1,1,2,2-Tetrachloroethane	V	L	168	9.4E+01	7.1E-02	7.9E-06	3.0E+03	3.5E-04	1.4E-02			2.0E-01	2.0E-01	6.0E-02	6.0E-02	5.8E-05	2.1E+02
Tetrachloroethene	V	L	166	1.6E+02	7.2E-02	8.2E-06	2.0E+02	1.8E-02	7.5E-01			5.4E-01	2.1E-02	1.0E-02	1.1E-01	5.9E-06	4.0E+02
Thallium	NV	S	204											8.0E-05			
Toluene	V	L	92	1.8E+02	8.7E-02	8.6E-06	5.3E+02	6.6E-03	2.7E-01					2.0E-01	8.6E-02		3.0E+02
Toxaphene	NV	S	414	4.9E+03			3.0E+00	2.1E-01	8.6E+00	0.05		1.2E+00	1.2E+00				
TPH (gasolines)	V	L	108	5.0E+03	7.0E-02	7.8E-06	1.5E+02	7.2E-04	3.0E-02	0.1				3.0E-02	1.4E-02		4.9E+01
TPH (middle distillates)	V	L	170	5.0E+03	7.0E-02	7.8E-06	5.0E+00	7.2E-04	3.0E-02	0.1				3.0E-02	1.4E-02		4.9E+01
TPH (residual fuels)	NV	L/S		5.0E+03			5.0E+00			0.1				3.0E-02	1.4E-02		
1,2,4-Trichlorobenzene	V	S	180	1.8E+03	3.0E-02	8.2E-06	3.0E+02	1.4E-03	5.8E-02			3.6E-03		1.0E-02	1.1E-03		4.0E+00
1,1,1-Trichloroethane	V	L	133	1.1E+02	7.8E-02	8.8E-06	1.3E+03	1.7E-02	7.1E-01					2.8E-01	6.3E-01		2.2E+03
1,1,2-Trichloroethane	V	L	133	5.0E+01	7.8E-02	8.8E-06	4.4E+03	9.1E-04	3.7E-02			7.2E-02	5.6E-02	4.0E-03	4.0E-03	1.6E-05	1.4E+01
Trichloroethene	V	L	131	1.7E+02	7.9E-02	9.1E-06	1.1E+03	1.0E-02	4.2E-01			1.3E-02	7.0E-03	3.0E-04	1.7E-01	2.0E-06	6.0E+02
2,4,5-Trichlorophenol	V	S	198	8.9E+01	2.9E-02	7.0E-06	1.2E+03	2.2E-04	8.9E-03					1.0E-01	1.0E-01		3.5E+02
2,4,6-Trichlorophenol	NV	S	198	2.0E+03			8.0E+02	4.0E-06	1.6E-04			1.1E-02	1.1E-02	1.0E-04			
Vanadium	NV	S	51											1.0E-03			
Vinyl chloride	V	G	63	1.9E+01	1.1E-01	1.2E-06	2.8E+03	2.7E-02	1.1E+00			1.5E+00	2.7E-01	3.0E-03	2.9E-02	7.8E-05	1.0E+02
Xylenes	V	L	106	4.1E+02	7.0E-02	7.8E-06	1.6E+02	7.3E-03	3.0E-01					2.0E-01	2.9E-02		1.0E+02
Zinc	NV	S	65											3.0E-01			

Notes:
 Physical state of chemical at ambient conditions (V - volatile, NV - nonvolatile, S - solid, L - liquid, G - gas).
 Chemical considered to be "volatile" if Henry's Law constant (atm m³/mole) >0.00001 and molecular weight <200.
 Dibromochloromethane, dibromochloropropane and pyrene considered volatile for purposes of modeling (USEPA 2002).

Lookup Table H. Physical-Chemical and Toxicity Values Used in Models

Chemical	State	Molecular Weight (g/mole)	Organic Carbon Partition Coefficient K_{oc} (cm^3/g)	Diffusivity in Air D_a (cm^2/s)	Diffusivity in Water D_w (cm^2/s)	Pure Component Water Solubility S (mg/L)	Henry's Law Constant H ($atm\cdot m^3/mol$)	Adjusted Henry's Law Constant H' ($atm\cdot m^3/mol$)	Skin Absorption Factor ABS (unitless)	Oral Cancer Slope Factor SF_o ($mg/kg\cdot day$) ⁻¹	Inhalation Cancer Slope Factor SF_i ($mg/kg\cdot day$) ⁻¹	Oral Reference Dose RfD_o (mg/kg-day)	Inhalation Reference Dose RfD_i (mg/kg-day)	Unit Risk Factor URF (ug/m^3)	Reference Concentration RfC (ug/m^3)
<p>TPH -Total Petroleum Hydrocarbons. RfD values from MADEP 2002. See text for discussion of different TPH categories.</p> <p>Physical-chemical constants and ABS values from (in order of preference): CalEPA 2004, USEPA Region 9 (USEPA 2004) or Ontario MOEE (MOEE 1996), except as noted. OEHHA screening numbers for arsenic and dioxin equate to ABS values of 0.01 and 0.02 (used above), versus 0.04 and 0.002 as noted in OEHHA document.</p> <p>Physical-chemical constants for polychlorinated biphenyls and toxaphene from ATSDR 2001. PCB solubility from MOEE (1996).</p> <p>Physical-chemical constants for 1,4 Dioxane from "Solvent Stabilizers - White Paper" (Mohr 2001).</p> <p>Cancer Slope Factors from CalEPA 2004 and CalEPA 2003 where available (marked by "**"); otherwise from USEPA as presented in Region 9 PRGs (USEPA 2004). Reference dose factors from CalEPA 2004; otherwise as presented in USEPA Region 9 PRGs.</p> <p>Physical-chemical values for MtBE from <i>Assessment and Management of MtBE Impacted Sites</i> (RWQCB 2001). Oral cancer slope factor from OEHHA (CalEPA 1999).</p> <p>Physical-chemicals and toxicity constants for xylenes based on <i>m</i>-xylene.</p> <p>Diffusivity constants for methylnaphthalene not available. Constants presented based on naphthalene.</p> <p>RfDs for acenaphthylene, methylnaphthylene, and phenanthrene based on fluorene; RfDs for benzo(g,h,i)perylene based on fluoranthene (after MADEP 1994).</p> <p>All water associated with the Snake River Plain Aquifer is considered to be a drinking water source.</p>															

Lookup Table I-1. Direct Exposure Soil Cleanup Standard Values
¹Unrestricted Exposure Scenario

Chemical	Final cleanup value (mg/kg)	Basis	Carcinogens (Risk = 10 ⁻⁶) (mg/kg)	Noncarcinogens ² (HQ = 0.2) (mg/kg)	Noncarcinogens (HQ = 1.0) (mg/kg)	Saturation (mg/kg)
Acenaphthene	5.0E+02	noncarcinogenic effects	-	5.0E+02	2.5E+03	N/A
Acenaphthylene	3.4E+02	noncarcinogenic effects	-	3.4E+02	1.7E+03	N/A
Acetone	2.8E+03	noncarcinogenic effects	-	2.8E+03	1.4E+04	1.0E+05
Aldrin	3.2E-02	carcinogenic effects	3.2E-02	4.1E-01	2.1E+00	N/A
Anthracene	3.1E+03	noncarcinogenic effects	-	3.1E+03	1.6E+04	N/A
Antimony	6.3E+00	noncarcinogenic effects	-	6.3E+00	3.1E+01	N/A
Arsenic	3.9E-01	carcinogenic effects	3.9E-01	4.3E+00	2.2E+01	N/A
Barium	3.0E+03	noncarcinogenic effects	-	3.0E+03	1.5E+04	N/A
Benzene	1.2E-01	carcinogenic effects	1.2E-01	4.7E+00	2.4E+01	8.7E+02
Benzo(a)anthracene	3.8E-01	carcinogenic effects	3.8E-01	3.4E+02	1.7E+03	N/A
Benzo(b)fluoranthene	3.8E-01	carcinogenic effects	3.8E-01	3.4E+02	1.7E+03	N/A
Benzo(k)fluoranthene	3.8E-01	carcinogenic effects	3.8E-01	3.4E+02	1.7E+03	N/A
Benzo(g,h,i)perylene	3.4E+02	noncarcinogenic effects	-	3.4E+02	1.7E+03	N/A
Benzo(a)pyrene	3.8E-02	carcinogenic effects	3.8E-02	3.4E+02	1.7E+03	N/A
Beryllium	3.1E+01	noncarcinogenic effects	1.1E+03	3.1E+01	1.5E+02	N/A
1,1-Biphenyl	6.1E+02	noncarcinogenic effects	-	6.1E+02	3.1E+03	N/A
Bis(2-chloroethyl) ether	1.5E-01	carcinogenic effects	1.5E-01	-	-	9.6E+03
Bis(2-chloroisopropyl) ether	3.4E-02	carcinogenic effects	3.4E-02	1.4E+02	7.0E+02	7.9E+02
Bis(2-ethylhexyl) phthalate	3.5E+01	carcinogenic effects	3.5E+01	2.4E+02	1.2E+03	N/A
Boron	3.1E+03	noncarcinogenic effects	-	3.1E+03	1.6E+04	N/A
Bromodichloromethane	5.7E-01	carcinogenic effects	5.7E-01	3.1E+01	1.6E+02	3.0E+03
Bromoform (Tribromomethane)	8.1E+01	carcinogenic effects	8.1E+01	3.1E+02	1.6E+03	N/A
Bromomethane	7.0E-01	noncarcinogenic effects	-	7.0E-01	3.5E+00	3.1E+03
Cadmium	1.7E+00	carcinogenic effects	1.7E+00	7.8E+00	3.9E+01	N/A
Carbon tetrachloride	2.0E-02	carcinogenic effects	2.0E-02	3.4E+00	1.7E+01	1.1E+03
Chlordane	4.4E-01	carcinogenic effects	4.4E-01	7.0E+00	3.5E+01	N/A
p-Chloroaniline	6.3E+01	noncarcinogenic effects	-	6.3E+01	3.1E+02	N/A
Chlorobenzene	1.6E+02	noncarcinogenic effects	-	1.6E+02	8.0E+02	6.8E+02

Lookup Table I-1. Direct Exposure Soil Cleanup Standard Values
¹Unrestricted Exposure Scenario

Chemical	Final cleanup value (mg/kg)	Basis	Carcinogens (Risk = 10 ⁻⁶) (mg/kg)	Noncarcinogens ² (HQ = 0.2) (mg/kg)	Noncarcinogens (HQ = 1.0) (mg/kg)	Saturation (mg/kg)
Chloroethane	1.0E+01	noncarcinogenic effects	2.2E+02	1.0E+01	5.1E+01	1.6E+03
Chloroform	6.8E-01	carcinogenic effects	6.8E-01	3.9E+01	1.9E+02	2.9E+03
Chloromethane	7.7E+00	noncarcinogenic effects	-	7.7E+00	3.8E+01	4.1E+03
2-Chlorophenol	7.6E+00	noncarcinogenic effects	-	7.6E+00	3.8E+01	5.5E+04
Chromium (total)	-	-	-	-	-	N/A
Chromium III	2.3E+04	noncarcinogenic effects	-	2.3E+04	1.2E+05	N/A
Chromium VI	9.4E+00	noncarcinogenic effects	1.7E+01	9.4E+00	4.7E+01	N/A
Chrysene	6.2E+01	carcinogenic effects	6.2E+01	3.4E+02	1.7E+03	N/A
Cobalt	2.8E+02	noncarcinogenic effects	9.1E+02	2.8E+02	1.4E+03	N/A
Copper	6.3E+03	noncarcinogenic effects	-	6.3E+03	3.1E+04	N/A
Cyanide	3.4E+01	noncarcinogenic effects	-	3.4E+01	1.7E+02	N/A
Dibenz(a,h)anthracene	6.2E-02	carcinogenic effects	6.2E-02	3.4E+02	1.7E+03	N/A
Dibromochloromethane	7.6E+00	carcinogenic effects	7.6E+00	3.1E+02	1.6E+03	N/A
1,2-dibromo-3-chloropropane	9.1E-02	carcinogenic effects	9.1E-02	2.4E+04	1.2E+05	N/A
1,2-Dibromoethane	1.9E-02	carcinogenic effects	1.9E-02	5.3E+00	2.6E+01	N/A
1,2-Dichlorobenzene	1.3E+02	noncarcinogenic effects	-	1.3E+02	6.5E+02	6.0E+02
1,3-Dichlorobenzene	6.5E+01	noncarcinogenic effects	-	6.5E+01	3.3E+02	6.0E+02
1,4-Dichlorobenzene	1.2E+00	carcinogenic effects	1.2E+00	2.4E+02	1.2E+03	N/A
3,3-Dichlorobenzidine	5.3E-01	carcinogenic effects	5.3E-01	-	-	N/A
Dichlorodiphenyldichloroethane (DDD)	2.4E+00	carcinogenic effects	2.4E+00	7.2E+00	3.6E+01	N/A
Dichlorodiphenyldichloroethene (DDE)	1.7E+00	carcinogenic effects	1.7E+00	7.2E+00	3.6E+01	N/A
Dichlorodiphenyltrichloroethane (DDT)	1.7E+00	carcinogenic effects	1.7E+00	7.2E+00	3.6E+01	N/A
1,1-Dichloroethane	2.2E+00	carcinogenic effects	2.2E+00	7.8E+01	3.9E+02	1.7E+03
1,2-Dichloroethane	2.2E-01	carcinogenic effects	2.2E-01	1.4E+00	6.8E+00	1.8E+03
1,1-Dichloroethene	1.9E+01	noncarcinogenic effects	-	1.9E+01	9.7E+01	1.5E+03
<i>cis</i> -1,2-Dichloroethene	6.5E+00	noncarcinogenic effects	-	6.5E+00	3.2E+01	1.2E+03
<i>trans</i> -1,2-Dichloroethene	1.0E+01	noncarcinogenic effects	-	1.0E+01	5.1E+01	3.1E+03
2,4-Dichlorophenol	4.7E+01	noncarcinogenic effects	-	4.7E+01	2.3E+02	N/A

Lookup Table I-1. Direct Exposure Soil Cleanup Standard Values
¹Unrestricted Exposure Scenario

Chemical	Final cleanup value (mg/kg)	Basis	Carcinogens (Risk = 10 ⁻⁶) (mg/kg)	Noncarcinogens ² (HQ = 0.2) (mg/kg)	Noncarcinogens (HQ = 1.0) (mg/kg)	Saturation (mg/kg)
1,2-Dichloropropane	4.6E-01	carcinogenic effects	4.6E-01	9.1E-01	4.6E+00	1.1E+03
1,3-Dichloropropene	1.7E-01	carcinogenic effects	1.7E-01	2.5E+00	1.3E+01	1.4E+03
Dieldrin	3.4E-02	carcinogenic effects	3.4E-02	6.9E-01	3.4E+00	N/A
Diethyl phthalate	9.8E+03	noncarcinogenic effects	-	9.8E+03	4.9E+04	N/A
Dimethyl phthalate	1.2E+05	noncarcinogenic effects	-	1.2E+05	6.1E+05	N/A
2,4-Dimethylphenol	3.1E+02	noncarcinogenic effects	-	3.1E+02	1.6E+03	N/A
2,4-Dinitrophenol	3.1E+02	noncarcinogenic effects	-	3.1E+02	1.6E+03	N/A
2,4-Dinitrotoluene	9.4E-01	carcinogenic effects	9.4E-01	3.1E+01	1.6E+02	N/A
1,4-Dioxane	2.4E+01	carcinogenic effects	2.4E+01	3.5E+08	1.8E+09	N/A
Dioxin (2,3,7,8-TCDD)	4.5E-06	carcinogenic effects	4.5E-06	-	-	N/A
Endosulfan	8.2E+01	noncarcinogenic effects	-	8.2E+01	4.1E+02	N/A
Endrin	4.1E+00	noncarcinogenic effects	-	4.1E+00	2.1E+01	N/A
Ethylbenzene	2.3E+00	carcinogenic effects	2.3E+00	2.4E+02	1.2E+03	4.0E+02
Fluoranthene	4.6E+02	noncarcinogenic effects	-	4.6E+02	2.3E+03	N/A
Fluorene	3.9E+02	noncarcinogenic effects	-	3.9E+02	1.9E+03	N/A
Heptachlor	1.2E-01	carcinogenic effects	1.2E-01	6.9E+00	3.4E+01	N/A
Heptachlor epoxide	6.1E-02	carcinogenic effects	6.1E-02	1.8E-01	8.9E-01	N/A
Hexachlorobenzene	3.4E-01	carcinogenic effects	3.4E-01	1.1E+01	5.5E+01	N/A
Hexachlorobutadiene	3.1E+00	noncarcinogenic effects	8.2E+00	3.1E+00	1.6E+01	N/A
γ-Hexachlorocyclohexane (Lindane)	4.1E+00	noncarcinogenic effects	-	4.1E+00	2.1E+01	N/A
Hexachloroethane	1.2E+01	noncarcinogenic effects	1.2E+01	1.2E+01	6.1E+01	N/A
Indeno(1,2,3-c,d)pyrene	6.2E-01	carcinogenic effects	6.2E-01	3.4E+02	1.7E+03	N/A
Lead	2.6E+02	noncarcinogenic effects	-	2.6E+02	2.6E+02	N/A
Mercury (elemental)	1.3E+00	noncarcinogenic effects	-	1.3E+00	6.7E+00	N/A
Methoxychlor	-	-	-	-	-	N/A
Methylene chloride	7.2E+00	carcinogenic effects	7.2E+00	7.0E+01	3.5E+02	2.4E+03
Methyl ethyl ketone	4.3E+03	noncarcinogenic effects	-	4.3E+03	2.1E+04	3.4E+04
Methyl isobutyl ketone	3.1E+03	noncarcinogenic effects	-	3.1E+03	1.6E+04	1.7E+04

Lookup Table I-1. Direct Exposure Soil Cleanup Standard Values
¹Unrestricted Exposure Scenario

Chemical	Final cleanup value (mg/kg)	Basis	Carcinogens (Risk = 10 ⁻⁶) (mg/kg)	Noncarcinogens ² (HQ = 0.2) (mg/kg)	Noncarcinogens (HQ = 1.0) (mg/kg)	Saturation (mg/kg)
Methyl mercury	1.2E+00	noncarcinogenic effects	-	1.2E+00	6.1E+00	N/A
2-Methylnaphthalene	4.6E+01	noncarcinogenic effects	-	4.6E+01	2.3E+02	N/A
<i>tert</i> -Butyl methyl ether	3.0E+01	carcinogenic effects	3.0E+01	1.1E+03	5.6E+03	2.1E+04
Molybdenum	7.8E+01	noncarcinogenic effects	-	7.8E+01	3.9E+02	N/A
Naphthalene	1.3E+00	carcinogenic effects	1.3E+00	6.1E+00	3.1E+01	N/A
Nickel	3.0E+02	noncarcinogenic effects	-	3.0E+02	1.5E+03	N/A
Pentachlorophenol	3.0E+00	carcinogenic effects	3.0E+00	2.8E+01	1.4E+02	N/A
Perchlorate	1.1E+01	noncarcinogenic effects	-	1.1E+01	5.5E+01	N/A
Phenanthrene	3.4E+02	noncarcinogenic effects	-	3.4E+02	1.7E+03	N/A
Phenol	4.7E+03	noncarcinogenic effects	-	4.7E+03	2.3E+04	N/A
Polychlorinated biphenyls (PCBs)	2.2E-01	carcinogenic effects	2.2E-01	2.2E-01	1.1E+00	N/A
Pyrene	6.9E+02	noncarcinogenic effects	-	6.9E+02	3.4E+03	N/A
Selenium	7.8E+01	noncarcinogenic effects	-	7.8E+01	3.9E+02	N/A
Silver	7.8E+01	noncarcinogenic effects	-	7.8E+01	3.9E+02	N/A
Styrene	5.0E+02	noncarcinogenic effects	-	5.0E+02	2.5E+03	1.5E+03
<i>tert</i> -Butyl alcohol	3.2E+05	saturation limit	-	-	-	3.2E+05
1,1,1,2-Tetrachloroethane	2.0E+00	carcinogenic effects	2.0E+00	4.7E+02	2.3E+03	2.0E+03
1,1,2,2-Tetrachloroethane	2.7E-01	carcinogenic effects	2.7E-01	1.4E+02	7.0E+02	2.0E+03
Tetrachloroethene	3.7E-01	carcinogenic effects	3.7E-01	4.3E+01	2.2E+02	2.3E+02
Thallium	1.3E+00	noncarcinogenic effects	-	1.3E+00	6.3E+00	N/A
Toluene	6.3E+01	noncarcinogenic effects	-	6.3E+01	3.2E+02	6.5E+02
Toxaphene	4.6E-01	carcinogenic effects	4.6E-01	-	-	N/A
TPH (gasolines)	1.1E+02	noncarcinogenic effects	-	1.1E+02	5.4E+02	4.5E+03
TPH (middle distillates)	1.1E+02	noncarcinogenic effects	-	1.1E+02	5.4E+02	N/A
TPH (residual fuels)	3.7E+02	noncarcinogenic effects	-	3.7E+02	1.8E+03	N/A
1,2,4-Trichlorobenzene	7.9E+00	noncarcinogenic effects	1.8E+02	7.9E+00	3.9E+01	N/A
1,1,1-Trichloroethane	2.8E+02	noncarcinogenic effects	-	2.8E+02	1.4E+03	1.2E+03
1,1,2-Trichloroethane	5.0E-01	carcinogenic effects	5.0E-01	5.1E+00	2.5E+01	1.8E+03

Lookup Table I-1. Direct Exposure Soil Cleanup Standard Values
¹Unrestricted Exposure Scenario

Chemical	Final cleanup value (mg/kg)	Basis	Carcinogens (Risk = 10⁻⁶) (mg/kg)	Noncarcinogens ²(HQ = 0.2) (mg/kg)	Noncarcinogens (HQ = 1.0) (mg/kg)	Saturation (mg/kg)
Trichloroethene	1.9E+00	carcinogenic effects	1.9E+00	4.5E+00	2.2E+01	1.3E+03
2,4,5-Trichlorophenol	4.0E+02	noncarcinogenic effects	-	4.0E+02	2.0E+03	N/A
2,4,6-Trichlorophenol	1.6E+00	noncarcinogenic effects	5.8E+01	1.6E+00	7.8E+00	N/A
Vanadium	1.6E+01	noncarcinogenic effects	-	1.6E+01	7.8E+01	N/A
Vinyl chloride	2.2E-02	carcinogenic effects	2.2E-02	7.0E+00	3.5E+01	1.2E+03
Xylenes	3.1E+01	noncarcinogenic effects	-	3.1E+01	1.5E+02	4.2E+02
Zinc	4.7E+03	noncarcinogenic effects	-	4.7E+03	2.3E+04	N/A

Primary source: USEPA Region 9 Preliminary Remediation Goals (PRGs, USEPA 2004), modified as noted below. See text for discussion.

Notes:

1. "Residential" cleanup standard values generally considered adequate for other sensitive uses (e.g., day-care centers, hospitals, etc.).

See text for equations and assumptions used in models.

Final cleanup standard value is lowest of individual cleanup standard values for carcinogenic effects and noncarcinogenic effects (based on HQ=0.2).

workers if lower (see Table K-3). Saturation limit used as upper limit for volatile organic compounds that are liquid at ambient conditions (see text).

Carcinogens: Based on target cancer risk of 10⁻⁶; modified with respect to CalEPA/OEHHA slope factors when available (marked by "**"). cleanup standard values for PCBs based on updated USEPA slope factors as presented in USEPA Region 9 Preliminary Remediation Goals document (USEPA 2004).

Noncarcinogens: Adjusted to target hazard quotient of 0.2 for use in tables for all chemicals. Cleanup standard values based on hazard quotient of 1.0 provided for reference.

Saturation: Theoretical soil saturation level in the absence of free product; calculated for volatile organic compounds that are liquids under ambient conditions (refer to Table J).

TPH: Total Petroleum Hydrocarbons. See text for discussion of different TPH categories. Direct exposure cleanup standard values after Massachusetts Department of Environmental Protection (see text).

Direct-exposure cleanup standard value for lead from Office of Human Hazard Evaluation CHHSLs (CalEPA 2004).

All water associated with the Snake River Plain Aquifer is considered to be a drinking water source.

**Lookup Table I-2. Direct Exposure Soil Cleanup Standard Values
Commerical/Industrial Worker Exposure Scenario**

Chemical	Final cleanup standard value (mg/kg)	Basis	Carcinogens (Risk = 10 ⁻⁶) (mg/kg)	Noncarcinogens (HQ = 0.2) (mg/kg)	Noncarcinogens (HQ = 1.0) (mg/kg)	Saturation (mg/kg)
Acenaphthene	3.1E+03	noncarcinogenic effects	-	3.1E+03	1.6E+04	N/A
Acenaphthylene	3.3E+03	noncarcinogenic effects	-	3.3E+03	1.7E+04	N/A
Acetone	1.1E+04	noncarcinogenic effects	-	1.1E+04	5.3E+04	1.0E+05
Aldrin	1.3E-01	carcinogenic effects	1.3E-01	4.6E+00	2.3E+01	N/A
Anthracene	2.6E+04	noncarcinogenic effects	-	2.6E+04	1.3E+05	N/A
Antimony	8.2E+01	noncarcinogenic effects	-	8.2E+01	4.1E+02	N/A
Arsenic	1.6E+00	carcinogenic effects	1.6E+00	5.1E+01	2.6E+02	N/A
Barium	3.4E+04	noncarcinogenic effects	-	3.4E+04	1.7E+05	N/A
Benzene	2.7E-01	carcinogenic effects	2.7E-01	1.6E+01	8.2E+01	8.7E+02
Benzo(a)anthracene	1.3E+00	carcinogenic effects	1.3E+00	3.3E+03	1.7E+04	N/A
Benzo(b)fluoranthene	1.3E+00	carcinogenic effects	1.3E+00	3.3E+03	1.7E+04	N/A
Benzo(k)fluoranthene	1.3E+00	carcinogenic effects	1.3E+00	3.3E+03	1.7E+04	N/A
Benzo(g,h,i)perylene	3.3E+03	noncarcinogenic effects	-	3.3E+03	1.7E+04	N/A
Benzo(a)pyrene	1.3E-01	carcinogenic effects	1.3E-01	3.3E+03	1.7E+04	N/A
Beryllium	3.9E+02	noncarcinogenic effects	2.2E+03	3.9E+02	1.9E+03	N/A
1,1-Biphenyl	6.2E+03	noncarcinogenic effects	-	6.2E+03	3.1E+04	N/A
Bis(2-chloroethyl) ether	3.8E-01	carcinogenic effects	3.8E-01	-	-	9.6E+03
Bis(2-chloroisopropyl) ether	7.7E-02	carcinogenic effects	7.7E-02	5.5E+02	2.7E+03	7.9E+02
Bis(2-ethylhexyl) phthalate	1.2E+02	carcinogenic effects	1.2E+02	2.5E+03	1.2E+04	N/A
Boron	4.1E+04	noncarcinogenic effects	-	4.1E+04	2.0E+05	N/A
Bromodichloromethane	1.3E+00	carcinogenic effects	1.3E+00	1.1E+02	5.6E+02	3.0E+03
Bromoform (Tribromomethane)	3.6E+02	carcinogenic effects	3.6E+02	4.1E+03	2.0E+04	N/A
Bromomethane	2.3E+00	noncarcinogenic effects	-	2.3E+00	1.2E+01	3.1E+03
Cadmium	7.4E+00	carcinogenic effects	7.4E+00	1.0E+02	5.1E+02	N/A
Carbon tetrachloride	4.4E-02	carcinogenic effects	4.4E-02	1.5E+01	7.3E+01	1.1E+03
Chlordane	1.7E+00	carcinogenic effects	1.7E+00	8.1E+01	4.0E+02	N/A
p-Chloroaniline	8.2E+02	noncarcinogenic effects	-	8.2E+02	4.1E+03	N/A
Chlorobenzene	6.8E+02	saturation limit	-	8.5E+02	4.3E+03	6.8E+02

**Lookup Table I-2. Direct Exposure Soil Cleanup Standard Values
Commerical/Industrial Worker Exposure Scenario**

Chemical	Final cleanup standard value (mg/kg)	Basis	Carcinogens (Risk = 10 ⁻⁶) (mg/kg)	Noncarcinogens (HQ = 0.2) (mg/kg)	Noncarcinogens (HQ = 1.0) (mg/kg)	Saturation (mg/kg)
Chloroethane	3.4E+01	noncarcinogenic effects	9.9E+02	3.4E+01	1.7E+02	1.6E+03
Chloroform	1.5E+00	carcinogenic effects	1.5E+00	1.6E+02	7.8E+02	2.9E+03
Chloromethane	2.5E+01	noncarcinogenic effects	-	2.5E+01	1.3E+02	4.1E+03
2-Chlorophenol	2.7E+01	noncarcinogenic effects	-	2.7E+01	1.3E+02	5.5E+04
Chromium (total)	-	-	-	-	-	N/A
Chromium III	3.1E+05	noncarcinogenic effects	-	3.1E+05	1.5E+06	N/A
Chromium VI	3.6E+01	carcinogenic effects	3.6E+01	3.6E+01	1.8E+02	N/A
Chrysene	2.1E+02	carcinogenic effects	2.1E+02	3.3E+03	1.7E+04	N/A
Cobalt	1.9E+03	carcinogenic effects	1.9E+03	2.7E+03	1.3E+04	N/A
Copper	8.2E+04	noncarcinogenic effects	-	8.2E+04	4.1E+05	N/A
Cyanide	1.2E+02	noncarcinogenic effects	-	1.2E+02	6.1E+02	N/A
Dibenz(a,h)anthracene	2.1E-01	carcinogenic effects	2.1E-01	3.3E+03	1.7E+04	N/A
Dibromochloromethane	3.4E+01	carcinogenic effects	3.4E+01	4.1E+03	2.0E+04	N/A
1,2-dibromo-3-chloropropane	4.1E-01	carcinogenic effects	4.1E-01	7.7E+04	3.8E+05	N/A
1,2-Dibromoethane	4.4E-02	carcinogenic effects	4.4E-02	1.8E+01	8.9E+01	N/A
1,2-Dichlorobenzene	4.6E+02	noncarcinogenic effects	-	4.6E+02	2.3E+03	6.0E+02
1,3-Dichlorobenzene	2.4E+02	noncarcinogenic effects	-	2.4E+02	1.2E+03	6.0E+02
1,4-Dichlorobenzene	2.6E+00	carcinogenic effects	2.6E+00	1.3E+03	6.6E+03	N/A
3,3-Dichlorobenzidine	2.4E+00	carcinogenic effects	2.4E+00	-	-	N/A
Dichlorodipenyldichloroethane (DDD)	1.0E+01	carcinogenic effects	1.0E+01	8.5E+01	4.3E+02	N/A
Dichlorodipenyldichloroethene (DDE)	7.0E+00	carcinogenic effects	7.0E+00	8.5E+01	4.3E+02	N/A
Dichlorodipenyltrichloroethane (DDT)	7.0E+00	carcinogenic effects	7.0E+00	8.5E+01	4.3E+02	N/A
1,1-Dichloroethane	4.7E+00	carcinogenic effects	4.7E+00	2.7E+02	1.3E+03	1.7E+03
1,2-Dichloroethane	4.8E-01	carcinogenic effects	4.8E-01	4.5E+00	2.2E+01	1.8E+03
1,1-Dichloroethene	6.5E+01	noncarcinogenic effects	-	6.5E+01	3.2E+02	1.5E+03
<i>cis</i> -1,2-Dichloroethene	2.2E+01	noncarcinogenic effects	-	2.2E+01	1.1E+02	1.2E+03
<i>trans</i> -1,2-Dichloroethene	3.4E+01	noncarcinogenic effects	-	3.4E+01	1.7E+02	3.1E+03
2,4-Dichlorophenol	6.1E+02	noncarcinogenic effects	-	6.1E+02	3.1E+03	N/A

**Lookup Table I-2. Direct Exposure Soil Cleanup Standard Values
Commerical/Industrial Worker Exposure Scenario**

Chemical	Final cleanup standard value (mg/kg)	Basis	Carcinogens (Risk = 10 ⁻⁶) (mg/kg)	Noncarcinogens (HQ = 0.2) (mg/kg)	Noncarcinogens (HQ = 1.0) (mg/kg)	Saturation (mg/kg)
1,2-Dichloropropane	1.0E+00	carcinogenic effects	1.0E+00	3.0E+00	1.5E+01	1.1E+03
1,3-Dichloropropene	3.6E-01	carcinogenic effects	3.6E-01	8.4E+00	4.2E+01	1.4E+03
Dieldrin	1.3E-01	carcinogenic effects	1.3E-01	7.7E+00	3.8E+01	N/A
Diethyl phthalate	9.8E+04	noncarcinogenic effects	-	9.8E+04	4.9E+05	N/A
Dimethyl phthalate	1.2E+06	noncarcinogenic effects	-	1.2E+06	6.2E+06	N/A
2,4-Dimethylphenol	4.1E+03	noncarcinogenic effects	-	4.1E+03	2.0E+04	N/A
2,4-Dinitrophenol	4.1E+03	noncarcinogenic effects	-	4.1E+03	2.0E+04	N/A
2,4-Dinitrotoluene	4.2E+00	carcinogenic effects	4.2E+00	4.1E+02	2.0E+03	N/A
1,4-Dioxane	1.1E+02	carcinogenic effects	1.1E+02	1.2E+09	5.8E+09	N/A
Dioxin (2,3,7,8-TCDD)	1.8E-05	carcinogenic effects	1.8E-05	-	-	N/A
Endosulfan	9.2E+02	noncarcinogenic effects	-	9.2E+02	4.6E+03	N/A
Endrin	4.6E+01	noncarcinogenic effects	-	4.6E+01	2.3E+02	N/A
Ethylbenzene	5.0E+00	carcinogenic effects	5.0E+00	8.7E+02	4.3E+03	4.0E+02
Fluoranthene	4.4E+03	noncarcinogenic effects	-	4.4E+03	2.2E+04	N/A
Fluorene	2.8E+03	noncarcinogenic effects	-	2.8E+03	1.4E+04	N/A
Heptachlor	4.8E-01	carcinogenic effects	4.8E-01	7.7E+01	3.8E+02	N/A
Heptachlor epoxide	2.4E-01	carcinogenic effects	2.4E-01	2.0E+00	1.0E+01	N/A
Hexachlorobenzene	1.3E+00	carcinogenic effects	1.3E+00	1.2E+02	6.1E+02	N/A
Hexachlorobutadiene	3.7E+01	carcinogenic effects	3.7E+01	4.1E+01	2.0E+02	N/A
γ-Hexachlorocyclohexane (Lindane)	4.6E+01	noncarcinogenic effects	-	4.6E+01	2.3E+02	N/A
Hexachloroethane	4.4E+01	carcinogenic effects	4.4E+01	1.2E+02	6.2E+02	N/A
Indeno(1,2,3-c,d)pyrene	2.1E+00	carcinogenic effects	2.1E+00	3.3E+03	1.7E+04	N/A
Lead	7.5E+02	noncarcinogenic effects	-	7.5E+02	7.5E+02	N/A
Mercury (elemental)	1.8E+01	noncarcinogenic effects	-	1.8E+01	8.8E+01	N/A
Methoxychlor	-	-	-	-	-	N/A
Methylene chloride	1.7E+01	carcinogenic effects	1.7E+01	2.4E+02	1.2E+03	2.4E+03
Methyl ethyl ketone	2.1E+04	noncarcinogenic effects	-	2.1E+04	1.1E+05	3.4E+04
Methyl isobutyl ketone	1.2E+04	noncarcinogenic effects	-	1.2E+04	6.1E+04	1.7E+04

**Lookup Table I-2. Direct Exposure Soil Cleanup Standard Values
Commerical/Industrial Worker Exposure Scenario**

Chemical	Final cleanup standard value (mg/kg)	Basis	Carcinogens (Risk = 10 ⁻⁶) (mg/kg)	Noncarcinogens (HQ = 0.2) (mg/kg)	Noncarcinogens (HQ = 1.0) (mg/kg)	Saturation (mg/kg)
Methyl mercury	1.2E+01	noncarcinogenic effects	-	1.2E+01	6.2E+01	N/A
2-Methylnaphthalene	4.4E+02	noncarcinogenic effects	-	4.4E+02	2.2E+03	N/A
<i>tert</i> -Butyl methyl ether	6.5E+01	carcinogenic effects	6.5E+01	3.7E+03	1.8E+04	2.1E+04
Molybdenum	1.0E+03	noncarcinogenic effects	-	1.0E+03	5.1E+03	N/A
Naphthalene	2.8E+00	carcinogenic effects	2.8E+00	2.0E+01	1.0E+02	N/A
Nickel	3.4E+03	noncarcinogenic effects	-	3.4E+03	1.7E+04	N/A
Pentachlorophenol	9.0E+00	carcinogenic effects	9.0E+00	2.3E+02	1.2E+03	N/A
Perchlorate	1.4E+02	noncarcinogenic effects	-	1.4E+02	7.2E+02	N/A
Phenanthrene	3.3E+03	noncarcinogenic effects	-	3.3E+03	1.7E+04	N/A
Phenol	6.1E+04	noncarcinogenic effects	-	6.1E+04	3.1E+05	N/A
Polychlorinated biphenyls (PCBs)	7.4E-01	carcinogenic effects	7.4E-01	2.1E+00	1.1E+01	N/A
Pyrene	6.6E+03	noncarcinogenic effects	-	6.6E+03	3.3E+04	N/A
Selenium	1.0E+03	noncarcinogenic effects	-	1.0E+03	5.1E+03	N/A
Silver	1.0E+03	noncarcinogenic effects	-	1.0E+03	5.1E+03	N/A
Styrene	1.5E+03	saturation limit	-	1.8E+03	9.2E+03	1.5E+03
<i>tert</i> -Butyl alcohol	3.2E+05	saturation limit	-	-	-	3.2E+05
1,1,1,2-Tetrachloroethane	4.5E+00	carcinogenic effects	4.5E+00	6.1E+03	3.1E+04	2.0E+03
1,1,2,2-Tetrachloroethane	6.0E-01	carcinogenic effects	6.0E-01	5.2E+02	2.6E+03	2.0E+03
Tetrachloroethene	9.5E-01	carcinogenic effects	9.5E-01	1.8E+02	8.9E+02	2.3E+02
Thallium	1.6E+01	noncarcinogenic effects	-	1.6E+01	8.2E+01	N/A
Toluene	2.1E+02	noncarcinogenic effects	-	2.1E+02	1.1E+03	6.5E+02
Toxaphene	1.8E+00	carcinogenic effects	1.8E+00	-	-	N/A
TPH (gasolines)	4.5E+02	noncarcinogenic effects	-	4.5E+02	2.2E+03	4.5E+03
TPH (middle distillates)	4.5E+02	noncarcinogenic effects	-	4.5E+02	2.2E+03	N/A
TPH (residual fuels)	3.7E+03	noncarcinogenic effects	-	3.7E+03	1.8E+04	N/A
1,2,4-Trichlorobenzene	2.7E+01	noncarcinogenic effects	7.9E+02	2.7E+01	1.3E+02	N/A
1,1,1-Trichloroethane	9.5E+02	noncarcinogenic effects	-	9.5E+02	4.8E+03	1.2E+03
1,1,2-Trichloroethane	1.1E+00	carcinogenic effects	1.1E+00	1.8E+01	8.8E+01	1.8E+03

**Lookup Table I-2. Direct Exposure Soil Cleanup Standard Values
Commerical/Industrial Worker Exposure Scenario**

Chemical	Final cleanup standard value (mg/kg)	Basis	Carcinogens (Risk = 10 ⁻⁶) (mg/kg)	Noncarcinogens (HQ = 0.2) (mg/kg)	Noncarcinogens (HQ = 1.0) (mg/kg)	Saturation (mg/kg)
Trichloroethene	4.1E+00	carcinogenic effects	4.1E+00	5.2E+01	2.6E+02	1.3E+03
2,4,5-Trichlorophenol	1.6E+03	noncarcinogenic effects	-	1.6E+03	8.0E+03	N/A
2,4,6-Trichlorophenol	2.0E+01	noncarcinogenic effects	2.6E+02	2.0E+01	1.0E+02	N/A
Vanadium	2.0E+02	noncarcinogenic effects	-	2.0E+02	1.0E+03	N/A
Vinyl chloride	4.7E-02	carcinogenic effects	4.7E-02	2.6E+01	1.3E+02	1.2E+03
Xylenes	1.0E+02	noncarcinogenic effects	-	1.0E+02	5.1E+02	4.2E+02
Zinc	6.1E+04	noncarcinogenic effects	-	6.1E+04	3.1E+05	N/A
<p>Primary source: USEPA Region 9 Preliminary Remediation Goals (PRGs, USEPA 2004), modified as noted below. See text for discussion.</p> <p>Notes:</p> <p>See text for equations and assumptions used in models.</p> <p>Final cleanup standard value is lowest of individual cleanup standard values for carcinogenic effects and noncarcinogenic effects (based on HQ=0.2)</p> <p>Saturation limit used as upper limit for volatile organic compounds that are liquid at ambient conditions (see text).</p> <p>Carcinogens: Based on target cancer risk of 10⁻⁶; modified with respect to CalEPA/OEHHA slope factors when available (marked by "***"). Cleanup standard for PCBs based on updated USEPA slope factors as presented in USEPA Region IX Preliminary Remediation Goals document (USEPA 2004).</p> <p>Noncarcinogens: Adjusted to target hazard quotient of 0.2 for use in tables for all chemicals. Cleanup standard values based on hazard quotient of 1.0 provided for reference.</p> <p>Saturation: Theoretical soil saturation level in the absence of free product; calculated for volatile organic compounds that are liquids under ambient conditions (refer to Table J).</p> <p>TPH: Total Petroleum Hydrocarbons.</p> <p>Direct-exposure cleanup standard value for lead from USEPA Region 9 Preliminary Remediation Goals document (USEPA 2004).</p>						

**Lookup Table I-3. Direct Exposure Soil Cleanup Standard Values
Construction/Trench Worker Exposure Scenario**

Chemical	Final cleanup value (mg/kg)	Basis	Carcinogens (Risk = 10 ⁻⁶) (mg/kg)	Noncarcinogens HQ = 0.2 (mg/kg)	Noncarcinogens (HQ = 1.0) (mg/kg)	Saturation (mg/kg)
Acenaphthene	1.7E+04	noncarcinogenic effects	-	1.7E+04	8.3E+04	N/A
Acenaphthylene	1.1E+04	noncarcinogenic effects	-	1.1E+04	5.3E+04	N/A
Acetone	1.0E+05	saturation limit	-	1.2E+05	5.9E+05	1.0E+05
Aldrin	1.5E+00	carcinogenic effects	1.5E+00	1.6E+01	7.8E+01	N/A
Anthracene	1.0E+05	noncarcinogenic effects	-	1.0E+05	5.0E+05	N/A
Antimony	3.1E+02	noncarcinogenic effects	-	3.1E+02	1.5E+03	N/A
Arsenic	1.5E+01	carcinogenic effects	1.5E+01	1.8E+02	9.2E+02	N/A
Barium	2.6E+03	noncarcinogenic effects	-	2.6E+03	1.3E+04	N/A
Benzene	1.2E+01	carcinogenic effects	1.2E+01	1.9E+02	9.7E+02	8.7E+02
Benzo(a)anthracene	1.5E+01	carcinogenic effects	1.5E+01	1.1E+04	5.3E+04	N/A
Benzo(b)fluoranthene	1.5E+01	carcinogenic effects	1.5E+01	1.1E+04	5.3E+04	N/A
Benzo(k)fluoranthene	1.5E+01	carcinogenic effects	1.5E+01	1.1E+04	5.3E+04	N/A
Benzo(g,h,i)perylene	1.1E+04	noncarcinogenic effects	-	1.1E+04	5.3E+04	N/A
Benzo(a)pyrene	1.5E+00	carcinogenic effects	1.5E+00	1.1E+04	5.3E+04	N/A
Beryllium	9.8E+01	noncarcinogenic effects	1.1E+02	9.8E+01	4.9E+02	N/A
1,1-Biphenyl	2.0E+04	noncarcinogenic effects	-	2.0E+04	1.0E+05	N/A
Bis(2-chloroethyl) ether	1.3E+01	carcinogenic effects	1.3E+01	-	-	9.6E+03
Bis(2-chloroisopropyl) ether	3.0E+00	carcinogenic effects	3.0E+00	6.0E+03	3.0E+04	7.9E+02
Bis(2-ethylhexyl) phthalate	1.4E+03	carcinogenic effects	1.4E+03	8.0E+03	4.0E+04	N/A
Boron	6.3E+04	noncarcinogenic effects	-	6.3E+04	3.1E+05	N/A
Bromodichloromethane	5.3E+01	carcinogenic effects	5.3E+01	1.3E+03	6.5E+03	3.0E+03
Bromoform (Tribromomethane)	4.8E+03	carcinogenic effects	4.8E+03	1.5E+04	7.4E+04	N/A
Bromomethane	2.9E+01	noncarcinogenic effects	-	2.9E+01	1.4E+02	3.1E+03
Cadmium	3.9E+01	carcinogenic effects	3.9E+01	3.8E+02	1.9E+03	N/A
Carbon tetrachloride	1.9E+00	carcinogenic effects	1.9E+00	1.5E+02	7.4E+02	1.1E+03
Chlordane	2.1E+01	carcinogenic effects	2.1E+01	2.6E+02	1.3E+03	N/A
p-Chloroaniline	3.1E+03	noncarcinogenic effects	-	3.1E+03	1.5E+04	N/A
Chlorobenzene	6.8E+02	saturation limit	-	7.2E+03	3.6E+04	6.8E+02

**Lookup Table I-3. Direct Exposure Soil Cleanup Standard Values
Construction/Trench Worker Exposure Scenario**

Chemical	Final cleanup value (mg/kg)	Basis	Carcinogens (Risk = 10 ⁻⁶) (mg/kg)	Noncarcinogens HQ = 0.2 (mg/kg)	Noncarcinogens (HQ = 1.0) (mg/kg)	Saturation (mg/kg)
Chloroethane	4.2E+02	noncarcinogenic effects	1.3E+04	4.2E+02	2.1E+03	1.6E+03
Chloroform	6.3E+01	carcinogenic effects	6.3E+01	1.7E+03	8.3E+03	2.9E+03
Chloromethane	3.1E+02	noncarcinogenic effects	-	3.1E+02	1.6E+03	4.1E+03
2-Chlorophenol	3.2E+02	noncarcinogenic effects	-	3.2E+02	1.6E+03	5.5E+04
Chromium (total)	-	-	-	-	-	N/A
Chromium III	1.2E+06	noncarcinogenic effects	-	1.2E+06	5.8E+06	N/A
Chromium VI	5.3E-01	noncarcinogenic effects	1.8E+00	5.3E-01	2.6E+00	N/A
Chrysene	2.4E+03	carcinogenic effects	2.4E+03	1.1E+04	5.3E+04	N/A
Cobalt	9.4E+01	carcinogenic effects	9.4E+01	1.0E+02	5.2E+02	N/A
Copper	3.1E+05	noncarcinogenic effects	-	3.1E+05	1.5E+06	N/A
Cyanide	1.3E+03	noncarcinogenic effects	-	1.3E+03	6.7E+03	N/A
Dibenz(a,h)anthracene	2.4E+00	carcinogenic effects	2.4E+00	1.1E+04	5.3E+04	N/A
Dibromochloromethane	4.6E+02	carcinogenic effects	4.6E+02	1.5E+04	7.7E+04	N/A
1,2-dibromo-3-chloropropane	5.3E+00	carcinogenic effects	5.3E+00	1.1E+03	5.3E+03	N/A
1,2-Dibromoethane	1.7E+00	carcinogenic effects	1.7E+00	2.2E+02	1.1E+03	N/A
1,2-Dichlorobenzene	6.0E+02	saturation limit	-	5.4E+03	2.7E+04	6.0E+02
1,3-Dichlorobenzene	6.0E+02	saturation limit	-	2.7E+03	1.4E+04	6.0E+02
1,4-Dichlorobenzene	1.1E+02	carcinogenic effects	1.1E+02	1.1E+04	5.5E+04	N/A
3,3-Dichlorobenzidine	3.1E+01	carcinogenic effects	3.1E+01	-	-	N/A
Dichlorodipenyldichloroethane (DDD)	1.2E+02	carcinogenic effects	1.2E+02	3.0E+02	1.5E+03	N/A
Dichlorodipenyldichloroethene (DDE)	8.7E+01	carcinogenic effects	8.7E+01	3.0E+02	1.5E+03	N/A
Dichlorodiphenyltrichloroethane (DDT)	8.7E+01	carcinogenic effects	8.7E+01	3.0E+02	1.5E+03	N/A
1,1-Dichloroethane	2.0E+02	carcinogenic effects	2.0E+02	3.2E+03	1.6E+04	1.7E+03
1,2-Dichloroethane	2.1E+01	carcinogenic effects	2.1E+01	5.6E+01	2.8E+02	1.8E+03
1,1-Dichloroethene	8.0E+02	noncarcinogenic effects	-	8.0E+02	4.0E+03	1.5E+03
<i>cis</i> -1,2-Dichloroethene	2.7E+02	noncarcinogenic effects	-	2.7E+02	1.3E+03	1.2E+03
<i>trans</i> -1,2-Dichloroethene	4.2E+02	noncarcinogenic effects	-	4.2E+02	2.1E+03	3.1E+03
2,4-Dichlorophenol	2.2E+03	noncarcinogenic effects	-	2.2E+03	1.1E+04	N/A

**Lookup Table I-3. Direct Exposure Soil Cleanup Standard Values
Construction/Trench Worker Exposure Scenario**

Chemical	Final cleanup value (mg/kg)	Basis	Carcinogens (Risk = 10 ⁻⁶) (mg/kg)	Noncarcinogens HQ = 0.2 (mg/kg)	Noncarcinogens (HQ = 1.0) (mg/kg)	Saturation (mg/kg)
1,2-Dichloropropane	3.7E+01	noncarcinogenic effects	4.3E+01	3.7E+01	1.9E+02	1.1E+03
1,3-Dichloropropene	1.6E+01	carcinogenic effects	1.6E+01	1.0E+02	5.2E+02	1.4E+03
Dieldrin	1.6E+00	carcinogenic effects	1.6E+00	2.6E+01	1.3E+02	N/A
Diethyl phthalate	3.2E+05	noncarcinogenic effects	-	3.2E+05	1.6E+06	N/A
Dimethyl phthalate	4.0E+06	noncarcinogenic effects	-	4.0E+06	2.0E+07	N/A
2,4-Dimethylphenol	1.5E+04	noncarcinogenic effects	-	1.5E+04	7.7E+04	N/A
2,4-Dinitrophenol	1.1E+04	noncarcinogenic effects	-	1.1E+04	5.4E+04	N/A
2,4-Dinitrotoluene	5.6E+01	carcinogenic effects	5.6E+01	1.5E+03	7.4E+03	N/A
1,4-Dioxane	1.4E+03	carcinogenic effects	1.4E+03	1.6E+07	7.9E+07	N/A
Dioxin (2,3,7,8-TCDD)	2.3E-04	carcinogenic effects	2.3E-04	-	-	N/A
Endosulfan	3.1E+03	noncarcinogenic effects	-	3.1E+03	1.6E+04	N/A
Endrin	1.6E+02	noncarcinogenic effects	-	1.6E+02	7.8E+02	N/A
Ethylbenzene	2.1E+02	carcinogenic effects	2.1E+02	9.9E+03	4.9E+04	4.0E+02
Fluoranthene	1.4E+04	noncarcinogenic effects	-	1.4E+04	7.0E+04	N/A
Fluorene	1.2E+04	noncarcinogenic effects	-	1.2E+04	6.2E+04	N/A
Heptachlor	5.8E+00	carcinogenic effects	5.8E+00	2.6E+02	1.3E+03	N/A
Heptachlor epoxide	2.9E+00	carcinogenic effects	2.9E+00	6.8E+00	3.4E+01	N/A
Hexachlorobenzene	1.6E+01	carcinogenic effects	1.6E+01	4.2E+02	2.1E+03	N/A
Hexachlorobutadiene	1.5E+02	noncarcinogenic effects	4.8E+02	1.5E+02	7.4E+02	N/A
γ-Hexachlorocyclohexane (Lindane)	1.6E+02	noncarcinogenic effects	-	1.6E+02	8.0E+02	N/A
Hexachloroethane	4.0E+02	noncarcinogenic effects	5.1E+02	4.0E+02	2.0E+03	N/A
Indeno(1,2,3-c,d)pyrene	2.4E+01	carcinogenic effects	2.4E+01	1.1E+04	5.3E+04	N/A
Lead	7.5E+02	noncarcinogenic effects	-	7.5E+02	7.5E+02	N/A
Mercury (elemental)	5.8E+01	noncarcinogenic effects	-	5.8E+01	2.9E+02	N/A
Methoxychlor	-	-	-	-	-	N/A
Methylene chloride	6.3E+02	carcinogenic effects	6.3E+02	2.9E+03	1.4E+04	2.4E+03
Methyl ethyl ketone	3.4E+04	saturation limit	-	1.9E+05	9.5E+05	3.4E+04
Methyl isobutyl ketone	1.7E+04	saturation limit	-	1.3E+05	6.6E+05	1.7E+04

**Lookup Table I-3. Direct Exposure Soil Cleanup Standard Values
Construction/Trench Worker Exposure Scenario**

Chemical	Final cleanup value (mg/kg)	Basis	Carcinogens (Risk = 10 ⁻⁶) (mg/kg)	Noncarcinogens HQ = 0.2 (mg/kg)	Noncarcinogens (HQ = 1.0) (mg/kg)	Saturation (mg/kg)
Methyl mercury	4.1E+01	noncarcinogenic effects	-	4.1E+01	2.0E+02	N/A
2-Methylnaphthalene	1.4E+03	noncarcinogenic effects	-	1.4E+03	7.2E+03	N/A
<i>tert</i> -Butyl methyl ether	2.8E+03	carcinogenic effects	2.8E+03	4.6E+04	2.3E+05	2.1E+04
Molybdenum	3.9E+03	noncarcinogenic effects	-	3.9E+03	1.9E+04	N/A
Naphthalene	1.3E+02	carcinogenic effects	1.3E+02	2.5E+02	1.2E+03	N/A
Nickel	2.6E+02	noncarcinogenic effects	-	2.6E+02	1.3E+03	N/A
Pentachlorophenol	9.9E+01	carcinogenic effects	9.9E+01	7.2E+02	3.6E+03	N/A
Perchlorate	5.4E+02	noncarcinogenic effects	-	5.4E+02	2.7E+03	N/A
Phenanthrene	1.1E+04	noncarcinogenic effects	-	1.1E+04	5.3E+04	N/A
Phenol	2.3E+05	noncarcinogenic effects	-	2.3E+05	1.2E+06	N/A
Polychlorinated biphenyls (PCBs)	6.7E+00	noncarcinogenic effects	8.4E+00	6.7E+00	3.4E+01	N/A
Pyrene	2.1E+04	noncarcinogenic effects	-	2.1E+04	1.0E+05	N/A
Selenium	3.9E+03	noncarcinogenic effects	-	3.9E+03	1.9E+04	N/A
Silver	3.9E+03	noncarcinogenic effects	-	3.9E+03	1.9E+04	N/A
Styrene	1.5E+03	saturation limit	-	2.1E+04	1.0E+05	1.5E+03
<i>tert</i> -Butyl alcohol	3.2E+05	saturation limit	-	-	-	3.2E+05
1,1,1,2-Tetrachloroethane	1.9E+02	carcinogenic effects	1.9E+02	2.3E+04	1.2E+05	2.0E+03
1,1,2,2-Tetrachloroethane	2.4E+01	carcinogenic effects	2.4E+01	5.9E+03	3.0E+04	2.0E+03
Tetrachloroethene	3.0E+01	carcinogenic effects	3.0E+01	1.8E+03	9.2E+03	2.3E+02
Thallium	6.2E+01	noncarcinogenic effects	-	6.2E+01	3.1E+02	N/A
Toluene	6.5E+02	saturation limit	-	2.6E+03	1.3E+04	6.5E+02
Toxaphene	2.2E+01	carcinogenic effects	2.2E+01	-	-	N/A
TPH (gasolines)	4.2E+03	noncarcinogenic effects	-	4.2E+03	2.1E+04	4.5E+03
TPH (middle distillates)	4.2E+03	noncarcinogenic effects	-	4.2E+03	2.1E+04	N/A
TPH (residual fuels)	1.2E+04	noncarcinogenic effects	-	1.2E+04	5.8E+04	N/A
1,2,4-Trichlorobenzene	3.2E+02	noncarcinogenic effects	1.1E+04	3.2E+02	1.6E+03	N/A
1,1,1-Trichloroethane	1.2E+03	saturation limit	-	1.1E+04	5.7E+04	1.2E+03
1,1,2-Trichloroethane	4.6E+01	carcinogenic effects	4.6E+01	2.1E+02	1.1E+03	1.8E+03

**Lookup Table I-3. Direct Exposure Soil Cleanup Standard Values
Construction/Trench Worker Exposure Scenario**

Chemical	Final cleanup value (mg/kg)	Basis	Carcinogens (Risk = 10 ⁻⁶) (mg/kg)	Noncarcinogens HQ = 0.2 (mg/kg)	Noncarcinogens (HQ = 1.0) (mg/kg)	Saturation (mg/kg)
Trichloroethene	1.7E+02	carcinogenic effects	1.7E+02	2.2E+02	1.1E+03	1.3E+03
2,4,5-Trichlorophenol	1.7E+04	noncarcinogenic effects	-	1.7E+04	8.5E+04	N/A
2,4,6-Trichlorophenol	7.7E+01	noncarcinogenic effects	3.4E+03	7.7E+01	3.9E+02	N/A
Vanadium	7.7E+02	noncarcinogenic effects	-	7.7E+02	3.9E+03	N/A
Vinyl chloride	2.0E+00	carcinogenic effects	2.0E+00	3.0E+02	1.5E+03	1.2E+03
Xylenes	4.2E+02	saturation limit	-	1.3E+03	6.3E+03	4.2E+02
Zinc	2.3E+05	noncarcinogenic effects	-	2.3E+05	1.2E+06	N/A

Primary source: USEPA Region 9 Preliminary Remediation Goals (PRGs, USEPA 2004), modified as noted below. See text for discussion.

Notes:

See text for equations and assumptions used in models.

Final cleanup standard value is lowest of individual cleanup standard values for carcinogenic effects and noncarcinogenic effects (based on HQ=0.2) or protection value for construction/trench workers if lower (see Table K-3). Saturation limit used as upper limit for volatile organic compounds that are liquid at ambient conditions (see text).

Carcinogens: Based on target cancer risk of 10⁻⁶; modified with respect to CalEPA/OEHHA slope factors when available (marked by "**"). Cleanup standard values for PCBs based on updated USEPA slope factors as presented in USEPA Region 9 Preliminary Remediation Goals document (USEPA 2004).

Noncarcinogens: Adjusted to target hazard quotient of 0.2 for use in tables for all chemicals. Cleanup standard values based on hazard quotient of 1.0 provided for reference

Saturation: Theoretical soil saturation level in the absence of free product; calculated for volatile organic compounds that are liquids under ambient conditions (refer to Table J).

TPH: Total Petroleum Hydrocarbons. See text for discussion of different TPH categories.

All water associated with the Snake River Plain Aquifer is considered to be a drinking water source.

Lookup Table J. Target Organs and Chronic Health Effects
(For general reference only. Not intended to be comprehensive.
Refer to original documents for additional information.)

Chemical	Target Organs And Health Effects													
	Carcinogen	^a Alimentary Tract	Cardiovascular	Developmental	Endocrine	Eye	Hematologic	Immune	Kidney	Nervous	Reproductive	Respiratory	^b Skin	Other
Acenaphthene	NA	5,6						4					4	
Acenaphthylene	D						5,6	4					4	
Acetone	D	5,6					3		5,6					
Aldrin	B2	6								3				
Anthracene	D							4					4	
Antimony	D		4				3,4	5,7			4	1,3,4		hair loss (4)
Arsenic	A	3,4,6	1,2,4	1,2,3,4			3,4,6			1,2,3,4			1,3,4,6	
Barium	D		4				5		6		5			hypertension (6)
Benzene	A	3		1,2,4			1,2,3,4	3		1,2				
Benzo(a)anthracene	B2							4					4	No chronic toxicity factors.
Benzo(b)fluoranthene	B2							4					4	No chronic toxicity factors.
Benzo(k)fluoranthene	B2							4					4	No chronic toxicity factors.
Benzo(g,h,i)perylene	D	5,6					5,6	4	5,6				4	
Benzo(a)pyrene	B2							4			3		4	No chronic toxicity factors.
Beryllium	B1	1,6						2	1			1,2,3,4,6	3	
1,1-Biphenyl	D	3							6	3				
Bis(2-chloroethyl) ether	B2									4	4			No chronic toxicity factors.
Bis(2-chloroisopropyl) ether	NA						6							
Bis(2-ethylhexyl) phthalate	NA	7												No chronic toxicity factors.
Boron	D										4,6	5		
Bromodichloromethane	B2	4							4,6					
Bromoform (Tribromomethane)	B2	3,4,6							4	3,4				
Bromomethane	D	3,5,6	3	1,2					3,4	1,2,3,4		1,2,3,4,5,6		
Cadmium	B1								1,2,3,4,5,6			1,2,3,4		bone loss (1,4)

Lookup Table J. Target Organs and Chronic Health Effects
(For general reference only. Not intended to be comprehensive.
Refer to original documents for additional information.)

Chemical	Target Organs And Health Effects													
	Carcinogen	^a Alimentary Tract	Cardiovascular	Developmental	Endocrine	Eye	Hematologic	Immune	Kidney	Nervous	Reproductive	Respiratory	^b Skin	Other
Carbon tetrachloride	B2	1,2,4,6		1,2				4	1,2					
Chlordane	B2	3,4,6					3,5		4					
p-Chloroaniline	NA	3,6					5	3					3	
Chlorobenzene	D	1,2,3,5,6				3		1,2,3,4,5	3	1,2				
Chloroethane	B	1,2		1,2,4										
Chloroform	B2	1,2,3,4,6		1,2				1,2,3,4						
Chloromethane	C/D			4					3	3,4				
2-Chlorophenol	D	1,4		1						1,5,6				
Chromium (total)	-													
Chromium III	D												3	
Chromium VI	A					1				2	1,6			
Chrysene	B2						4						4	No chronic toxicity factors.
Cobalt	NA		3								3	3	3	hearing (3)
Copper	D										1,4	3		
Cyanide	D		1,4		1,4,6	4			1,5,6		4			
Dibenz(a,h)anthracene	B2						4						3,4	
Dibromochloromethane	C	6												
1,2-dibromo-3-chloropropane		1		1				3		1,3,4,5,6	1			
1,2-Dibromoethane	B2			4						4	1,3			
1,2-Dichlorobenzene	D	3						3					3	
1,3-Dichlorobenzene	D	3						3						
1,4-Dichlorobenzene	C	1,2,3,6				3		1,2,3	1,2	6	1,2			
3,3-Dichlorobenzidine	B2	3												No chronic toxicity factors.
Dichlorodiphenyldichloroethane (DDD)	B2													No chronic toxicity factors.

Lookup Table J. Target Organs and Chronic Health Effects
(For general reference only. Not intended to be comprehensive.
Refer to original documents for additional information.)

Chemical	Target Organs And Health Effects													
	Carcinogen	^a Alimentary Tract	Cardiovascular	Developmental	Endocrine	Eye	Hematologic	Immune	Kidney	Nervous	Reproductive	Respiratory	^b Skin	Other
Dichlorodiphenyldichloroethene (DDE)	B2													No chronic toxicity factors.
Dichlorodiphenyltrichloroethane (DDT)	B2	3,4,6								3	3			
1,1-Dichloroethane	C	3						3,4,5,7						
1,2-Dichloroethane	B2	1,2												
1,1-Dichloroethene	C/D	1,2,3,4,5,6						3	4		4			
<i>cis</i> -1,2-Dichloroethene	D	4					4,5,7							
<i>trans</i> -1,2-Dichloroethene	D	4					5,6				4			
2,4-Dichlorophenol	E							5						
1,2-Dichloropropane	B2	3					3				5			
1,3-Dichloropropene	B2	6									4			
Dieldrin	B2	6								3				
Diethyl phthalate	D			6							4			
Dimethyl phthalate	D													
2,4-Dimethylphenol	NA						5,6			5,6				
2,4-Dinitrophenol	NA					3,6				3				
2,4-Dinitrotoluene	B2	6	3				3			3,6				
1,4-Dioxane	B2	1,2	1,2					1,2						
Dioxin (2,3,7,8-TCDD)	NA	1,2,4		1,2,4	1,2,4		1,2	4			1,2,4	1,2,4	4	No chronic toxicity factors.
Endosulfan	NA	4		4,6			6	4	4,5,6	4,6	4			
Endrin	D	5,6		4					6	5				
Ethylbenzene	D	1,2,5,6		1,2,4,6	1,2				1,2,5,6	3	3		3	
Fluoranthene	D	5,6					5,6	4	5,6				4	
Fluorene	D						5,6	4					4	
Heptachlor	B2	6								7				

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Chemical	Target Organs And Health Effects													
	Carcinogen	^a Alimentary Tract	Cardiovascular	Developmental	Endocrine	Eye	Hematologic	Immune	Kidney	Nervous	Reproductive	Respiratory	^b Skin	Other
Heptachlor epoxide	B2	6								7				
Hexachlorobenzene	B2	1,3,4,6			4		4	4	4	3,4	3			bones (4)
Hexachlorobutadiene	C	4							4				3	
γ-Hexachlorocyclohexane (Lindane)	NA	1,3,6							1,3,6					
Hexachloroethane	C	3,4							3,4,6					
Indeno(1,2,3-c,d)pyrene	B2							4					4	No chronic toxicity factors.
Lead	B2	3,7	7	3,7			3,7	3,7	3,7	3,7	7			
Mercury (elemental)	D			4				1	1,3	1,2,3,5,6				
Methoxychlor	D	3		6					3	3	3,5,6			
Methylene chloride	B2	3,6	1,2						3	1,2				
Methyl ethyl ketone	D			6							1,3			
Methyl isobutyl ketone	NA									7				
Methyl mercury	C			6						1,6				
2-Methylnaphthalene	C						5,6	4					4	
<i>tert</i> -Butyl methyl ether	NA	1,2,6				1,2			1,2,6					
Molybdenum	D						6							
Naphthalene	B2					3	3	4				1,2,6	4	
Nickel	A/D	1,6					1,2		6			1,2,3	3	
Pentachlorophenol	B2	1,3,4,6		1,4			4	4	3,6	3,4	1	3,4		
Perchlorate					8		3							
Phenanthrene	D						5,6	4					4	
Phenol	D	1,2,3	1,2	4,6					1,2,3	1,2	5			
Polychlorinated biphenyls (PCBs)	B2	1,3,4		1,4	4	6	4	1,4,6			1,3,4		4	
Pyrene	D							4	5,6					

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Chemical	Target Organs And Health Effects													
	Carcinogen	^a Alimentary Tract	Cardiovascular	Developmental	Endocrine	Eye	Hematologic	Immune	Kidney	Nervous	Reproductive	Respiratory	^b Skin	Other
Selenium	D	1,2,3,6	1,2				6			1,2		1,3	3,4,6	Selenosis (4,6)
Silver	D												3,4,6	
Styrene	C	4,5,6					5,6			1,2,3,5,6		3	3	
<i>tert</i> -Butyl alcohol														No chronic toxicity factors.
1,1,1,2-Tetrachloroethane	C	6						6						
1,1,2,2-Tetrachloroethane	C	3,4								3,4				
Tetrachloroethene	NA	1,2,3,6						1,2,3						
Thallium	D	3	3			3	6			3,4	3,4		3	
Toluene	D	5,6		1,2,4				5,6	1,2,3,6	3	1,2,6			
Toxaphene	B2	4			4			4	4					
TPH (gasolines)	-													
TPH (middle distillates)	-													
TPH (residual fuels)	-													
1,2,4-Trichlorobenzene	D				5,6									
1,1,1-Trichloroethane	D	3,7								1,2				
1,1,2-Trichloroethane	C	6				7							3	
Trichloroethene	A	3,4,7		4,7		1,2	4	7	3,4,7	1,2,3,4				
2,4,5-Trichlorophenol	NA	1,3,5,6		1					3,5,6		1			
2,4,6-Trichlorophenol	B2	3												
Vanadium	D	4						4				3,4		
Vinyl chloride	A	1,3,4,6		1,4			3,4	4		4	1,4		3	No chronic toxicity factors.
Xylenes	D									1,2,3,4,5,6		1,2		
Zinc	D		1		4		1,2,4,5,6					1		

Lookup Table J. Target Organs and Chronic Health Effects
(For general reference only. Not intended to be comprehensive.
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Chemical	Target Organs And Health Effects												
	Carcinogen	^a Alimentary Tract	Cardiovascular	Developmental	Endocrine	Eye	Hematologic	Immune	Kidney	Nervous	Reproductive	Respiratory	^b Skin
<p>Notes:</p> <p>a. Includes gastro-intestinal tract, liver, spleen, gall bladder, etc.</p> <p>b. Includes skin sensitization but not general dermatitis or defatting of skin.</p> <p>Perchlorate: Chronic effects as summarized in California DHS Perchlorate Action Level supporting document (CalDHS 2001).</p> <p>Carcinogen Classification</p> <p>A: Human carcinogen</p> <p>B: Probable human carcinogen (B1: limited human evidence; B2 Sufficient evidence in animals and inadequate or no evidence in humans)</p> <p>C: Possible human carcinogen</p> <p>D: Not classifiable as to human carcinogenicity</p> <p>E: Evidence of noncarcinogenicity for humans</p> <p>NA: Carcinogen classification information not available</p> <p>All water associated with the Snake River Plain Aquifer is considered to be a drinking water source.</p> <p>References:</p> <p>1. CalARB, 2001, Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values: California Air Resources Board http://www.arb.ca.gov/toxics/healthval/contable.pdf.</p> <p>2. CalEPA, 2002, Determination of Noncancer Chronic Exposure Levels, Chronic Toxicity Summaries: Office of Environmental Health Hazard Assessment, September 2002. www.oehha.org/air/chronic_rels/AllChrels.html.</p> <p>3. USDHHS, 2003, International Chemical Safety Cards: International Programme on Chemical Safety: United Nations Environment Program, International Labour Office and World Health Organization (accessed July 2003); published through US Department of Health and Human Services, Centers for Disease Control and Prevention, www.cdc.gov/niosh/ipcs/ipccard.html.</p> <p>4. ATSDR, 2003, ToxFAQs™: Agency for Toxic Substances and Disease Registry (accessed July 2003), http://www.atsdr.cdc.gov/toxfaq.html.</p> <p>5. Illinois, 2001, Tiered Approach to Corrective Action Objectives (TACO): Illinois Environmental Protection Agency, Title 35, Part 742, Similar Acting Noncarcinogenic Chemicals (Appendix A, Table E), December, 1997, http://www.epa.state.il.us/land/taco/.</p>													

Lookup Table J. Target Organs and Chronic Health Effects
(For general reference only. Not intended to be comprehensive.
Refer to original documents for additional information.)

	Target Organs And Health Effects													
	Carcinogen	^a Alimentary Tract	Cardiovascular	Developmental	Endocrine	Eye	Hematologic	Immune	Kidney	Nervous	Reproductive	Respiratory	^b Skin	Other
Chemical														
<p>6. USEPA, 2003, IRIS: U.S. Environmental Protection Agency, IRIS Database (accessed July 2003); (Critical effect used for derivation of USEPA RfD as presented in IRIS database; may not be inclusive of all potentially significant health effects), http://www.epa.gov/iris/subst/index.html.</p> <p>7. ORNL, 2003, Risk Assessment Information System (RAIS), Toxicity Profiles: Oak Ridge National Laboratory/U.S. Department of Energy (accessed July 2003), RAGs A Format, especially Critical Effect used for derivation of RfDs, http://rais.ornl.gov/tools/tox_profiles.html.</p> <p>8. For additional online references, see also: Hazardous Substances (On-line) Database: U.S. National Library of Medicine, Toxicology Data Network, http://toxnet.nlm.nih.gov.</p>														

FIGURES

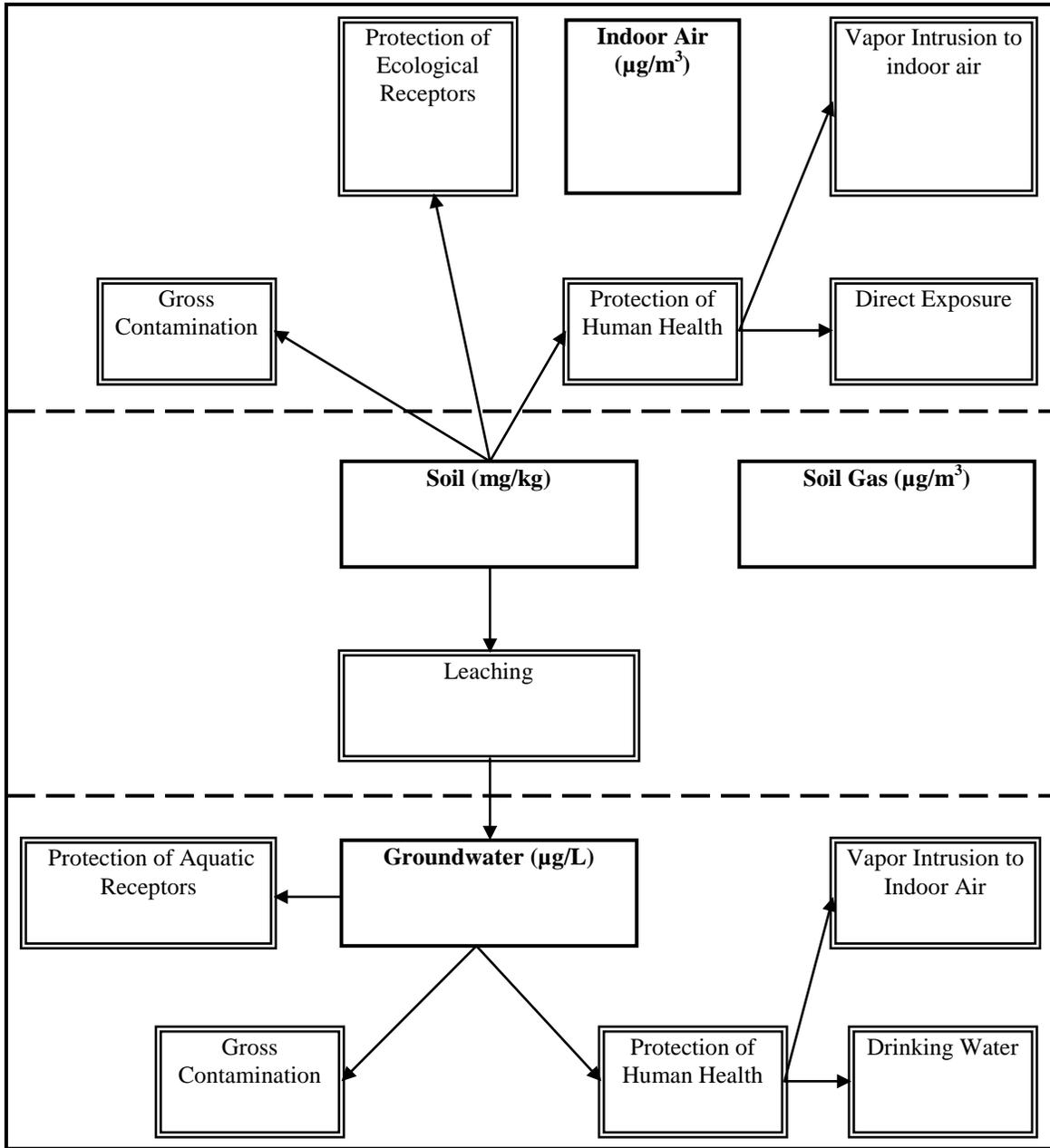


Figure 1. Summary of Health and Environmental Concerns Considered in Cleanup Standards¹⁴

¹⁴ This figure is taken from Figure 1 of the ESLs.

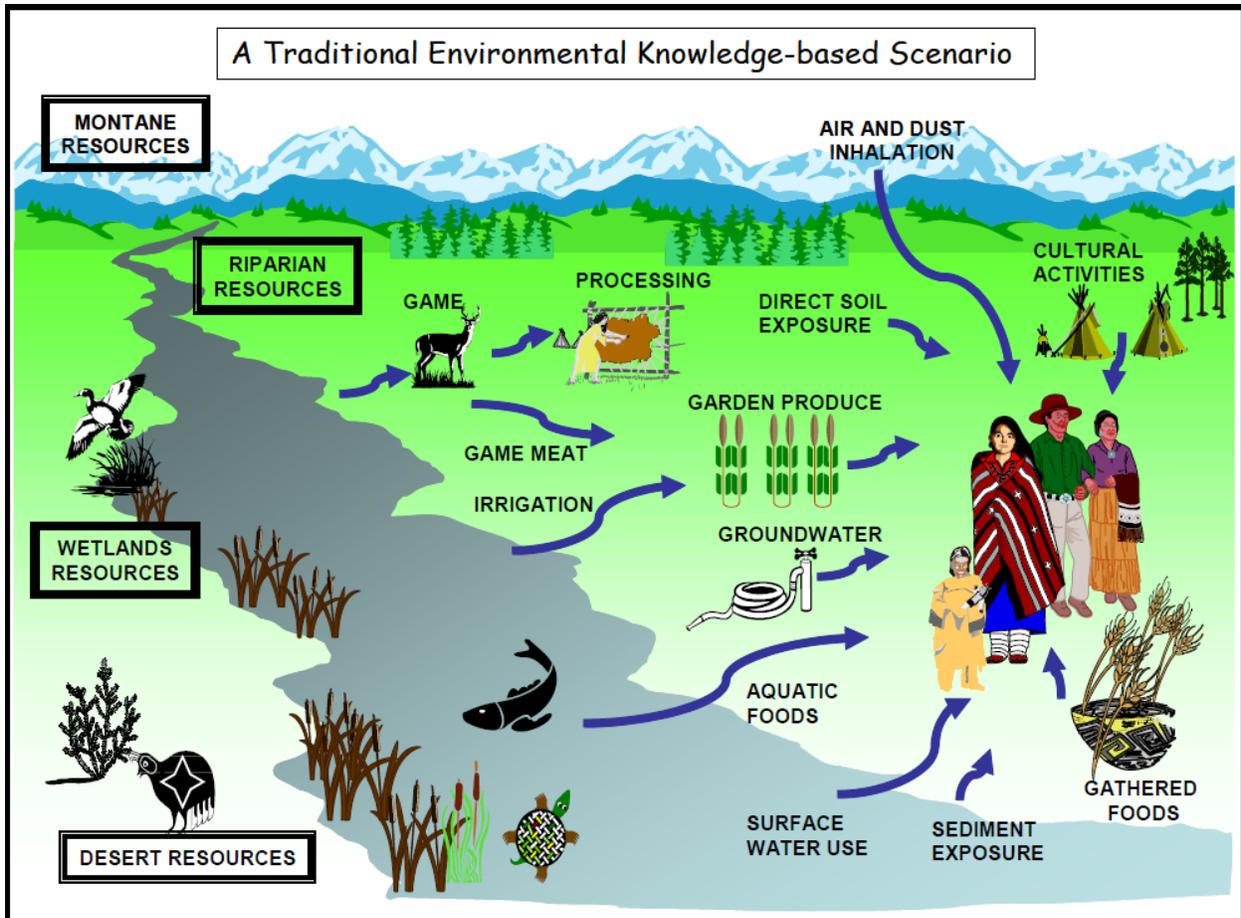


Figure 2. Tribal Exposure Pathways Based on a Subsistence Lifestyle¹⁵

¹⁵ This figure is taken from Figure 5 of Harper, Barbara L., et al. *Traditional Tribal Subsistence Exposure Scenario and Risk Assessment Guidance Manual*. (Aug. 2007.)

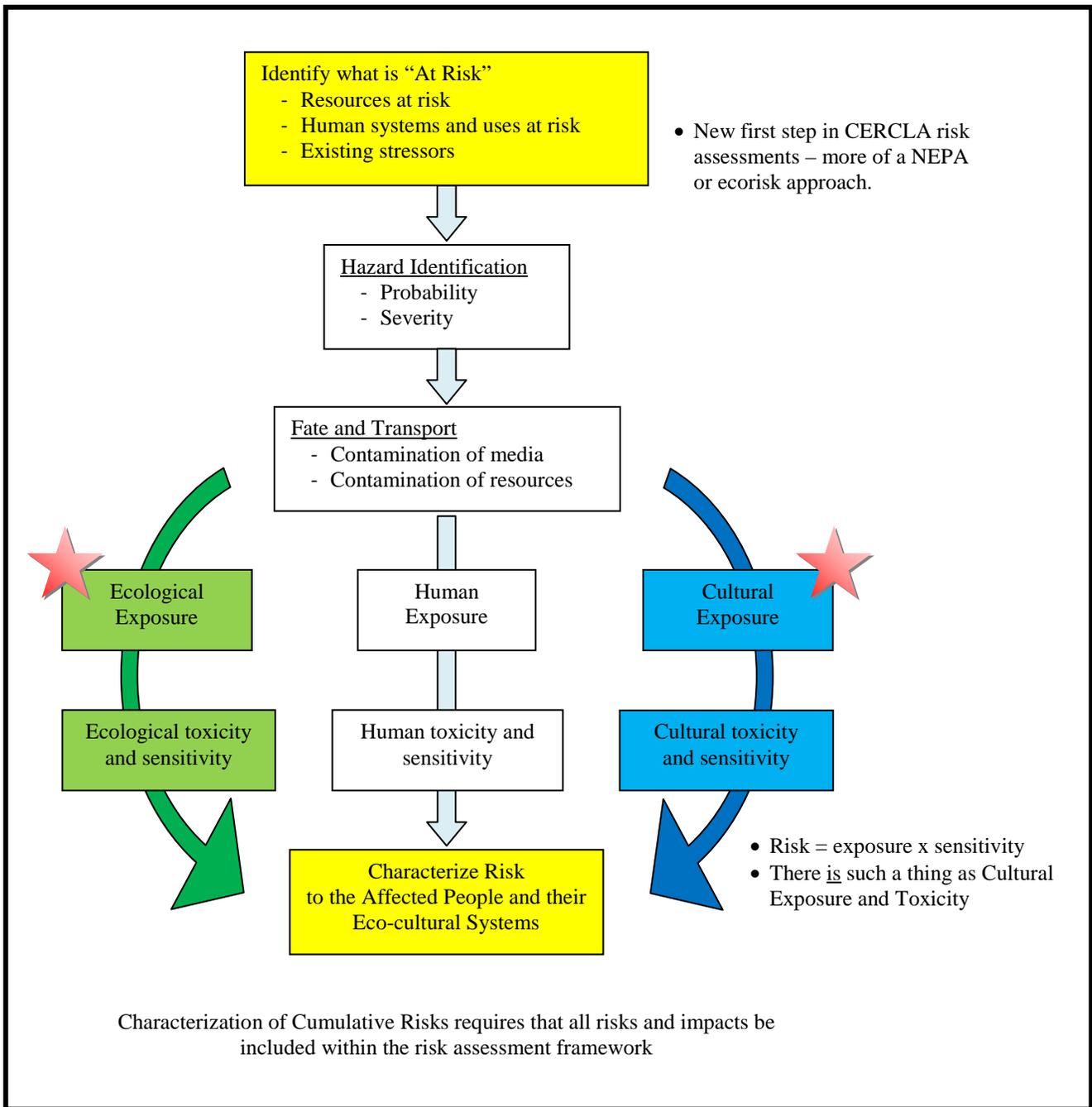


Figure 3. Tribal Risk Assessment with Three Components¹⁶

¹⁶ This figure is taken from Figure 14 of Harper, Barbara L., et al. *Traditional Tribal Subsistence Exposure Scenario and Risk Assessment Guidance Manual*. (Aug. 2007.)

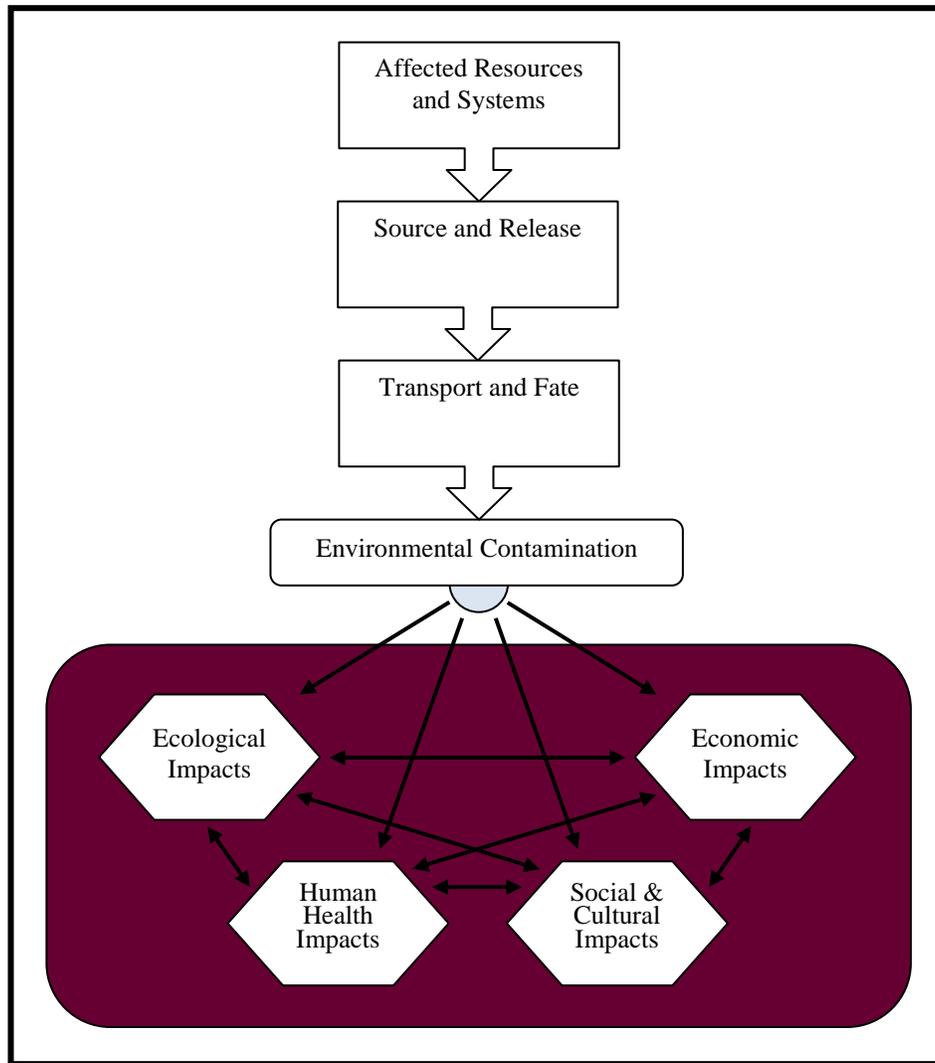


Figure 4. Tribal Risk Assessment with Four Components¹⁷

¹⁷ This figure is taken from Figure 15 of Harper, Barbara L., *et al.* *Traditional Tribal Subsistence Exposure Scenario and Risk Assessment Guidance Manual*. (Aug. 2007.)

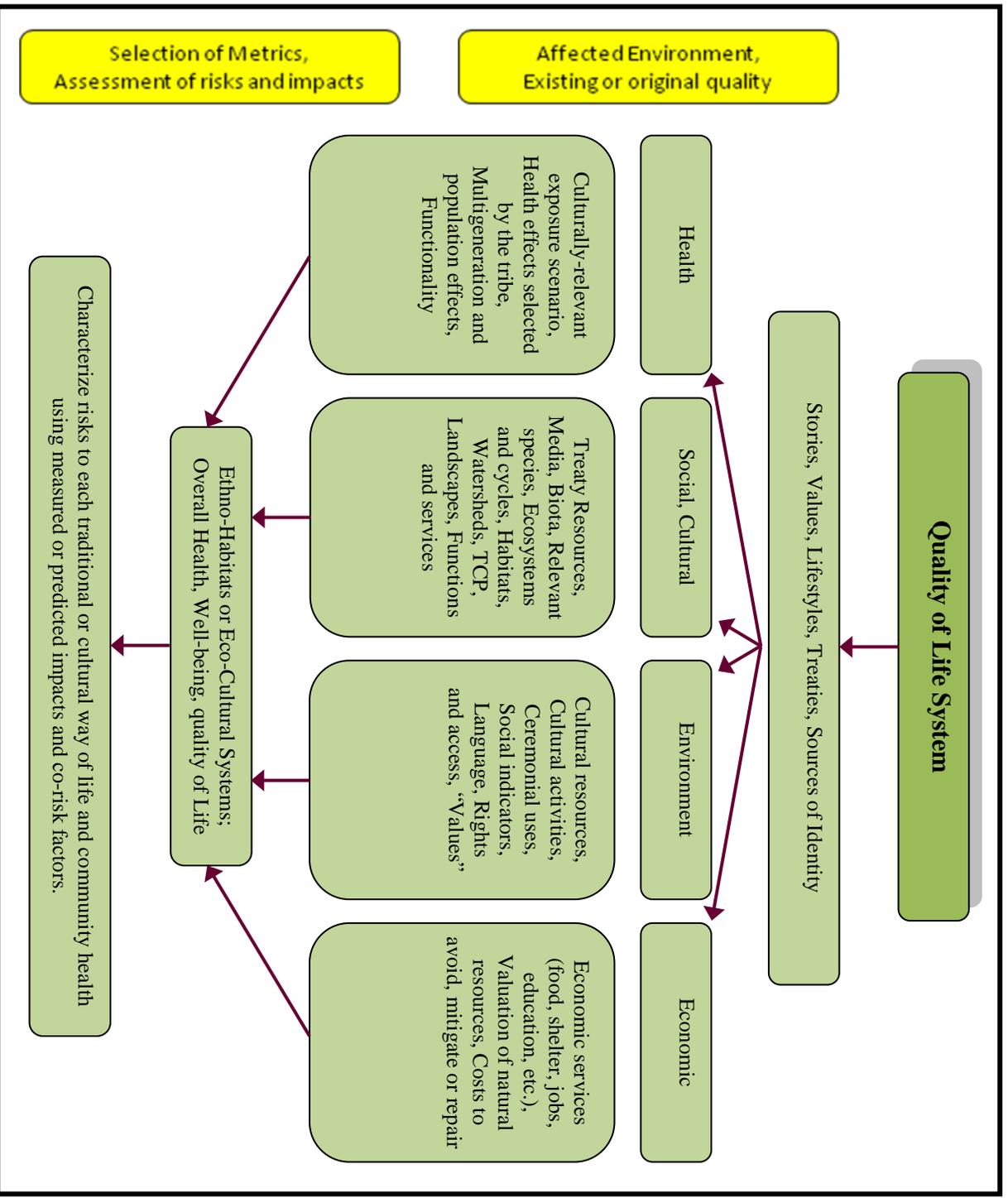


Figure 5. Categories of Environmental Functions Contributing to Individual and Community Health¹⁸

¹⁸ This figure is taken from Figure 16 of Harper, Barbara L., *et al. Traditional Tribal Subsistence Exposure Scenario and Risk Assessment Guidance Manual.* (Aug. 2007.)

OTHER TABLES

Table 1. Traditional Lifeways — Typical Activities in the Activity Categories¹⁹

Hunting	Purification	Gathering	Fishing
Learn skills	Learn skills, songs	Learn skills	Learn skills, TEK
Making tools	Build lodge from natural materials	Previous gathering	Make nets, poles, platforms, tools
Ritual bathing	Gather rocks	Make baskets, bags	Travel to location
Vigorous activity in hunting	Chop firewood	Hike to areas	Catch fish, haul out
Pack meat out	Prepare for use, get water	Cut, dig, harvest	Clean, can, hard dry, soft dry, smoke, eat whole fish or fillet or liver or other parts or soup
Process	Use Lodge, sing, drink water, inhale steam and smudges	Carry out items	Return carcasses to ecosystem, use as fertilizer
Scrape hides	Close area & fire	Wash, peel, process, split, spin, dye	
Tan, use other parts		Cook and eat or make product or medicine	
Cook, smoke, dry, eat meat and organs			

¹⁹ This table is taken from Table 8 of Harper, Barbara L. *et al.*, *Traditional Tribal Subsistence Exposure Scenario and Risk Assessment Guidance Manual*. (Aug. 2007.)

Table 2. Major Activity Categories²⁰

Activity Type	General Description
Hunting	Hunting includes a variety of preparation activities of low to moderate intensity. Hunting occurs in terrain ranging from flat and open to steep and rugged. It may also include setting traplines, waiting in blinds, climbing, etc. After the capture or kill, field dressing, packing or hauling, and other very strenuous activities occur, depending on the species. Subsequent activities include cutting, storing (e.g., smoking or drying), and returning the remains to the ecosystem.
Fishing	Fishing includes building weirs, hauling in lines and nets, gaffing or gigging, wading, followed by cleaning the fish and carrying them to the place of use. Activities associated with smoking and constructing drying racks may be involved. Remains are returned to aquatic ecosystems.
Gathering	Women gathered plants, bark, and firewood up to a day or two distant from the camp or village using a digging stick, knife, and basket or other means for carrying resources back to camp. A variety of activities is involved, such as hiking, bending, stooping, wading (marsh and water plants), digging, bundling, carrying, and climbing over a wide variety of terrains.
Ritual Purification (sweat lodge)	Sweat lodge building and repairing is intermittent, but collecting firewood is a constant activity. Willoughby (1906) and McBride and Prins (1983, citing Denys) suggest that the sweat lodge was used weekly or monthly, either in a cave or in a small structure covered with mats or skins.
Materials use and food preparation	Many activities of low to high intensity are involved in preparing materials for use or food storage. This category includes basket making, which is an example of a very important activity with its own set of prescribed activities, meanings, and cultural ethics.

²⁰ This table is taken from Table 2 of Harper, Barbara, et al., *Traditional Tribal Subsistence Exposure Scenario and Risk Assessment Guidance Manual*. (Aug. 2007).

Table 3. Example Exposure Considerations for Major Activity Categories²¹

	Hunting and associated activities	Fishing and associated activities	Gathering and associated activities	Ritual purification and associated activities	Material and food use and processing	Totals for major exposure factor categories
Food, medicine, tea, other biota ingestion (diet)	<i>n</i> deer/yr diet; Total large-small game, fowl; Organs eaten	<i>n</i> fish/yr diet; Total pounds of meals/day-wk-yr; Organs eaten	No food, but herbal particulates are inhaled	Includes foods, medicines, teas, etc.	Both as-gathered and as-eaten forms; cleaning and cooking methods	Must account for all calories, breadth of plant species; parts eaten
Soil, sediment, dust, and mud ingestion	Terrain types such as marsh with more mud contact	Sediment contact, dust and smoke if drying; Weir construction tide flats	External soil on plants; Cooking method	Includes building the sweat lodge and getting materials	Includes incidental soil remaining on foods	Must consider living area, unpaved roads, regional dust and mud
Inhalation rates	Days per terrain type; Exertion level; Hide scraping; Load & grade	Exertion level – nets and gaffing methods; cleaning effort	Exertion level for load and grade, or gardening; Include making items	Includes building the lodge, chopping firewood, singing	Exertion level for pounding, grinding, smoke from fires	Must account for exertion levels, smokes and smudges
Groundwater and surface water pathways	Ritual bathing, Drinking water; Wash water; Water-to-game and plant pathways	Drinking water; Incidental ingestion; Washing and cooking	Drinking water; Cooking water; Soaking in mud or water	Steam in lodge; Drinking water during sweat	Soaking; Washing; Leaching tannins; Other uses	Must account for climate, sweat lodge, ritual bathing
Dermal exposure	Soil, air, and water pathways, plus pigments, etc.	Immersion considerations	Same as hunting	Immersion with open skin pores	Includes basket making wounds	Must consider skin loading and habitat types

²¹ This table is taken from Table 4 of Harper, Barbara, *et al.*, *Traditional Tribal Subsistence Exposure Scenario and Risk Assessment Guidance Manual*. (Aug. 2007.)